Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

In this issue—

- Electrical Fishing Gear — P. 3
- Icing Fillets — P. 5
- Greening of Tuna — P. 9
- Measuring Texture — P. 13
- Federal Specifications — P. 15

— and 27 others

SEP 1958
LIBRARY
POFI
FISH & WILDLIFE SERVICE

Vol. 11 No. 9 *September 1958*

Fish and Wildlife Service
U. S. Department of the Interior
Washington D. C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FRED A. SEATON, SECRETARY

FISH AND WILDLIFE SERVICE
ARNIE J. SUOMELA, COMMISSIONER

Commercial Fisheries Abstracts

Prepared in the Division of Industrial Research and Services
Bureau of Commercial Fisheries

EDITORIAL STAFF

Charles Butler, Chief, Branch of Technology
Maurice E. Stansby, Chief, Pacific Coast and Alaska Technological Research
F. Bruce Sanford, Chemist
Kathryn L. Osterhaug, Fishery Products Technologist
Martin J. Heerdt, Chemist
Gladys K. Green, Editorial Clerk (Typist)

Applications for COMMERCIAL FISHERIES ABSTRACTS, which is mailed free to members of the fishery industries and allied interests, should be addressed to the Director, Bureau of Commercial Fisheries, United States Department of the Interior, Washington, 25, D.C.

Fulfillment of foreign requests confined to Government agencies, research institutions, and libraries.

The Service assumes no responsibility for the accuracy of material from outside sources, and can fulfill requests for copies of the articles only if the abstract was taken from a Service publication. Readers should direct requests for other articles to the author of the article or to the publication in which it appeared. The addresses of these publications are available from the Bureau of Commercial Fisheries, Washington 25, D. C.

The abstracts in this leaflet may be left in their present form; but it is suggested that to make the most efficient use of them, they be cut on the lines designated and filed by the number in the upper left-hand corner of each. For a full description of this filing system see "Fishery Technological Abstract Card System" by Maurice E. Stansby and K. L. Osterhaug, Fishery Leaflet No. 232, obtainable free by request from Bureau of Commercial Fisheries, Washington 25, D. C.

In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0 General and theoretical	3 Preserved fish	7 Analytical Methods
1 Fish by species	4 Oils	8 Composition
2 Fresh fish	5 Vitamins	9 Miscellaneous
	6 Fishery byproducts	

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.5 MARINE SPORE-FORMING BACTERIA

Newton, Dorothy E.
Contributions to Canadian Biology (New Series) 1, No. 19-25, 379-400 (1924)

Certain spore-forming bacteria are able to resist the heating process experienced by canned fish and shellfish. When these organisms grow in the canned product, they bring about undesirable changes that result in considerable loss to the fishing industry. The purpose of the work reported in this paper was therefore to isolate and study the spore-forming bacteria found in the sea and in fish and shellfish.

The plan of work consisted in (1) isolating spore formers from sea water at different stages of the tide and from the alimentary canal of lobsters, clams, mussels, limpets, flounders, herring, pollock, alewives, cod, haddock, and hake; (2) selecting those forms that because of their high thermal death points and their production of hydrogen sulfide, were likely to cause spoilage of canned fish; (3) identifying the selected forms by studying their morphological and physiological characteristics; and (4) accurately determining their thermal death points.

The conclusions drawn by the author were as follows: (1) Spore-forming bacteria are found both in sea water and in the alimentary canal of fish, crustaceans, and mollusks. (2) Most of these bacteria are capable of producing hydrogen sulfide. (3) Boiling for 3 hours was more than sufficient to kill the isolated spores of the organisms commonly found in the sea. (4) The growth of freshly isolated cultures was far more viscous or membranous than was that of later cultures that had been transferred 20 to 30 times. The tendency to clump or mass therefore is quite marked in the natural habitat. (5) The thermal death point of spores in clumps was extremely high in comparison with that of the individual spores. The thermal death point of spores in clumps therefore may exceed 3 hours at boiling temperature.

ABSTRACTER: F. Bruce Sanford

2.114 CONTROLLABLE-PITCH PROPELLERS AND THEIR MANY ADVANTAGES

Hardy, A. C. (The Fishing News, London, England)
Fishing Gazette 75, 58 (May 1958)

The controllable-pitch propeller is an outgrowth of the development in 1921 of large water turbines designed with adjustable runner blades to obtain maximum power at various loads.

As the name of the propeller suggests, the blades of the controllable-pitch propeller can be adjusted instantly while the vessel is in motion. In most large merchant vessels, the pitch is altered by a servo-motor in the propeller hub. A large piston moves in response to oil pressure, which is controlled by a slide valve in the piston rod. A telegraph-type control lever on the bridge connects directly to an auxiliary servo-motor mounted on an oil-distribution box inside the ship. In response to the signals, this motor operates a valve rod within the propeller shaft, and the piston in the hub moves sliding shoes in the crosshead that, through a blade-turning ring, alters the pitch of each blade an equal amount.

In another type of controllable-pitch propeller, which perhaps is more applicable to small vessels, the blade pitch is adjusted by a servo-motor inside the vessel. A pitch-adjusting rod passes through the hollow propeller shaft and connects the adjusting mechanism of the blades with the servo-motor piston, to which pressure oil is supplied through pipes.

In some vessels that are fitted with controllable-pitch propellers, two levers are used for controlling speed: one for altering blade pitch and the other for controlling shaft revolutions. In other installations, a single lever automatically selects pitch and revolution and thus prevents overloading of the engine.

(over)

ABSTRACTER: Kathryn L. Osterhaug

2.00 PROBLEMS IN DETERMINING FISH FRESHNESS

Stansby, Maurice E. (Fishery Technological Laboratory, U. S. Fish and Wildlife Service, Seattle 2, Washington)
Food Technology 12, 260-262 (May 1958)

A scientific test or group of tests that would indicate accurately and consistently the freshness of fish and possibly also predict their future keeping quality would be of great value to the commercial fishing industry. Chemical freshness tests have been proposed, but none are consistently accurate in measuring fish freshness for all species.

Some objectives of fish freshness tests are (1) to determine the elapsed time since the fish were caught regardless of whether any alteration has occurred in the fish, (2) to measure the alteration from the original condition--quality loss--, and (3) to predict the future keeping quality regardless of the exact condition of the fish at the time of sampling.

Changes occurring in fish during deterioration may either be considered as fundamental or as accessory changes. Fundamental changes result directly in the alteration of texture, flavor, odor, or appearance and affect the future keeping quality of the fish. Accessory changes occur in deteriorating fish without having any direct effect on quality.

Even with a single species of fish many different types of changes can occur as fish spoil. Oxidation of flavor constituents, bacterial spoilage, and enzymatic changes can cause loss of flavor, development of off-odor and off-flavors, alteration of texture, and diminishment of keeping quality. Because these reactions vary in a widespread manner, the pattern of spoilage from one lot of fish to another also varies. Since different reactions result from different causes and lead to different

(over)

ABSTRACTER: Herman S. Groninger

2.8 SMOKE BARREL COOKERY

Anonymous
Institutions 42, 41-43 (June 1958)

Construction of barrels for smoke-cooking fish is quite simple, requiring only a minimum of work and can be quickly done by the operator wishing to serve such a luncheon. Here's how it is done.

Starting with a used 40-gallon charred oak whiskey barrel or anything similar in size and construction, first step is to saw around the barrel about 8 inches from the top. This is then used as the lid and is secured to the remaining part of the barrel with a heavy hinge. To keep the lid from toppling over backwards when salmon is removed, attach a chain stopper.

Because the two grill-supporting chains lap over the rim of the barrel and would prevent a complete closure of the lid, it is necessary to notch two shallow V's on either side of barrel. Attach hooks or pins at the base of the V's for fastening the chains.

Allowing for four or five inches of sand in which the fire pot will eventually be imbedded, bore five or six draft holes, one-half inch in diameter around the sides of the barrel just above the sand level. Make wooden plugs to fit the holes.

The fire pot can be any heavy metal cylinder such as the bottom of a dutch oven. An ideal pot is an old automobile brake drum. However, it should be small enough to allow for three or four inches of sand insulation between barrel and the pot.

(over)

Reprinted in part

MARINE SPORE-FORMING BACTERIA

DETERMINING FISH FRESHNESS

CONTROLLABLE-PITCH PROPELLERS

SMOKE BARREL COOKERY

2.00

changes in the fish, it is obvious that a number of different tests must be applied to detect these changes. Future research on freshness tests should follow a more logical pattern; that is, they should be based on the development of tests for certain definite aspects of freshness. At least five different aspects need to be considered: (1) chemical changes that result in loss of normal flavor, (2) chemical changes that result in development of off-flavors and-odors, (3) changes that result in texture alteration, (4) changes in keeping quality, and (5) chemical changes that correlate with the length of time, since the fish was caught. For application to most commercial problems a relatively simple test is needed that can be carried out in a few minutes or at most in a few hours time.

2.8 (Cross Reference: 3.4)

The circular grill for the top of the barrel can be purchased at any store that specializes in barbecue equipment.

The grill is supported by two Y-shaped chains. The upper legs of the Y are equipped with snap-ons to fasten the grill. The bottom leg of each Y fastens on the hooks at the base of the notched V's.

To operate the barrel the sand at the bottom should first be soaked with water. The fire is started with charcoal briquets and then the smoke-producing wood is added.

While fish is smoking, care must be taken not to let the fire flare up. This is controlled by inserting the wooden plugs in the draft holes until an ideal balance between the fire and smoke is achieved.

Wood used in the smoking process depends upon taste and availability. Any nonresinous hard wood such as alder, apple, maple, oak, birch, or beech can be used.

Wood should be cut into small chunks about 4 inches in length or just long enough so they can be pyramided in the fire pot.

Prepare fish for cooking.--Barrel is now ready for use. Next operation is to prepare the salmon for smoking. This is done by first filleting them and removing the backbone. Cut into chunks suitable for individual servings. Soak chunks in saturated brine solution for an hour and a half. (Soaking time can be varied to suit individual tastes.)

Remove the chunks from the solution and arrange a single layer on grill rack, avoiding crowding. Lower grill into smoke barrel about 8 inches. Close and cook for about an hour and a half or until done, making sure fire is smoking and not burning during entire cooking process.

Should the barrel be out of service for any length of time during the luncheon, it is necessary to remove fire pot, insert draft plug holes, and fill with water to keep barrel from warping.

Although salmon is often used, the picturesque "smoke barrel" method can also be used for many other varieties of fish from both the western and eastern coasts including cod, whitefish, haddock, halibut, and lake trout. Method of preparation is essentially the same as for the salmon.

0.5 (Cross Reference: 3.33)

2.114

The controllable-pitch propeller is particularly suited to vessels that have to do a great deal of maneuvering or that have to work with limited engine power under widely varying sets of circumstances--such as tug or trawler. While the vessel is towing a ship or net or when it is running free, thrust is controlled by altering of the blade angle to secure suitable power. The engine can thus be set at one constant speed, which extends engine life and conserves fuel.

The controllable-pitch propeller also permits the use of nonreversing engines. It has, in fact, the particular advantage of giving better reversing power than do the geared turbines, whose ability to go astern is governed by the size and number of astern stages incorporated in the turbine casing. Full power is immediately available for running astern merely by changing the pitch of the blades.

Some people consider these propellers to be more reliable than a reverse reduction gear. Their reliability is indicated by the fact that they are fitted to some icebreakers and other vessels operating in ice-infested waters.

2.1121 THE MOUTH OF THE TRAWL

Phillips, Jack (Phillips Trawl Products, Ltd., Grimsby, England)
World Fishing 7, 60, 63, 64, 67 (May 1958)

The more open is the mouth of a trawl net, the greater is the chance of catching fish. The problem then is to open the mouth of the net to its fullest proportions. For this accomplishment, the vertical plane is more important than the horizontal plane, and the height of the headline has a more direct bearing on the potential catching power than has the spread caused by the trawl doors or otter boards. The trawl net therefore should be so designed that when fishing, the headline is left free to rise and is not restricted by a lateral pull.

Today there is a tendency for the more powerful trawlers to tow their gear at greater speeds than was formerly the practice. This causes more spread from the action of the otter boards and makes it necessary to shorten the belly line of the Granton trawl in order to overcome this tendency.

After the headline is free to be raised to its maximum proportions at all towing speeds, the most suitable method of achieving this condition must be selected. A funnel is useful for filling a container with liquid and the larger is the funnel, the more quickly can the job be done.

Two major factors must be considered when attempting to raise the headline: (1) the forces involved and (2) the towing speeds. The accompanying diagram illustrates the forces involved.

Lift represents the total vertical component--being a force combining buoyance and hydrodynamic upthrust, which is generated by the passage of the submerged floats through the water. Drag is the total horizontal component of the force generated by the passage of these floats The lower the drag can be made for a given lift, the less the headrope will be distorted backward and the greater is the

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.143 ELECTRICAL FISHING GEAR HAS GOOD POTENTIAL

Anonymous
National Fisherman 39, 9-10, 31 (April 1958)

Although electrical fishing still is in the development stage, the potential importance of electrical current for fisheries can be recognized. At present, the attracting effect as well as the blocking, driving, paralyzing, and killing effect of electric current is used. The gear can be used for removing useless and predatory fish.

Electrical barriers can prevent valuable commercial fish such as salmon from entering turbines and pumps, where they would be killed or damaged. They can be used to guide fish to new river systems and fish ways or to drive them into fishing gear.

It is possible to concentrate shoal fish by keeping an electrode before the aperture of a trawl net and to paralyze the fish so that they cannot escape the trawl. An electrode placed in front of a midwater trawl will attract shoal fish even from the lower area of the electrical field and will guide them into the catching area. This means the fish in the region beneath the net, which otherwise would not be taken, will be caught. An electrical midwater trawl also would enable otherwise unfishable, uneven, bottom to be exploited because the fish living near the ground are attracted toward the electrode.

There also is little doubt about the importance of improved quality of the flesh of fish that are paralyzed or killed electrically, the accumulation of lactic acid during the death struggle being prevented and the onset and disappearance of rigor mortis being delayed.

The effect of electric current on fish.--When direct current is passed into the water, nearly all fish swim toward the anode, but before reaching it, they usually are stupified and turn upside down. When the current is turned off, they recover and swim away.

When alternating current is used, the fish do not swim toward the electrodes, but they take a position crosswise to the direction of the current. Most of the fish undergo a kind of hypnosis after

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.117 WILL IT BE WORTHWHILE TO BUILD FUTURE FISHING CRAFT IN PLASTIC?

Anonymous
World Fishing 7, 36-37 (May 1958)

During the past 25 years, a number of new construction materials have been developed, and attempts have been made to use the new materials for the construction of complete boat hulls. One example is aluminum, which, though it is too expensive for the hull, has proved useful in the construction of fish holds and deck houses.

Plastics recently have proved useful for the construction of small craft. The advantages of plastic include: (1) Plastic hulls can be made with ease as soon as a mold has been manufactured; (2) the surface finish of plastic makes unnecessary the usual repainting; (3) plastic is rot-, rust-, and worm-proof; and (4) the strength of plastic is greater than the strength of wood. An additional advantage of plastic for use in fishing boats is its light weight. The use of plastic thus would make it possible to design a "sea-kindlier" ship, which would tend to extend fishing operations and result in more profitable operations.

Present practices in plastic construction makes it difficult to build boats of 70 to 80 feet. Another problem is to develop standard types acceptable to a number of fishermen. When these difficulties have been overcome, plastic boats may well supersede boats built of wood or steel.

Slow development also is caused by the reluctance of fishermen to take a chance on a relatively untried material. If manufacturers were to build a few prototypes and test them under fishing conditions at sea, fishermen would be able to judge the merits of plastic construction for themselves.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.9 FISH PROTEINS--NUTRITIVE VALUE

Venkataraman, R. and Chari, S. T.
Indian Journal of Medical Research 45, No. 1, p. 77 (Jan. 1957)
Konosu, S.; Katori, S.; Ota, R.; Eguchi, S.; and Mori, T.
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 11, p. 1163 (1956) (English summary)
World Fisheries Abstracts 9, 45-46 (March-April 1958)

The amino acid contents of HCl-hydrolyzed edible portions of mackerel (Rastrelliger kanagurta), pomfret (Stromateus niger), sardine (Sardinella fimbriata), oil sardine (Sardinella longiceps), hammerhead shark (Zygoena blochii), silverbelly (Leiognathus bindus), and sole (Cynoglossus semifasciatus) were determined by circular paper chromatography technique. The results are given in the table (over). Fish proteins compare well as regards amino acids with proteins from other animal sources and contain good amounts of lysine, leucine, valine, phenylalanine, methionine, threonine and tryptophane. The general pattern of amino acid make-up is the same in almost all the fishes studied but tryptophane is absent in the sardine group. Pomfret contains the highest amount of the leucines.

Amino acids in 10 different species of fish were determined by microbiological technique. The amino acid composition is shown in tables and the general pattern is uniform in the different spp. though some differences were noted with respect to aspartic acid. The content of essential amino acids in cuttle fish is almost the same as those of other fish.

See table, over.

(over)

 ABSTRACTER: G. N. Subba Rao

OPERATION OF TRAWL

PLASTIC FISHING BOATS

ELECTRICAL FISHING GEAR

AMINO ACIDS OF FISH

2.117

Two years ago, FAO naval architects made a survey of the possibilities of using plastic. They found that although the weight and strength of small plastic fishing boats provide advantages over boats of wooden construction, the price of plastic boats is higher. It was also evident that a design in plastic construction must be suitable for production in quantity to justify the expense of the initial production.

2.9

Amino acid composition of Indian fish muscle protein calculated to 16% nitrogen

Amino acids	Mackerel	Pomfret	Sardine	Oil Sardine	Hammerhead Shark	Silverbelly	Sole
Leucine	11.0	18.4	12.4	13.4	9.1	5.5	6.7
Phenylalanine	4.2	6.2	4.8	6.1	5.4	5.4	3.8
Valine	6.0	6.4	8.8	5.9	5.6) 7.3		6.9
Methionine	4.3	4.6	2.9	3.8	3.1)		
Tryptophane	1.1	1.8	Traces	Traces	2.1	2.1	1.9
Threonine	5.5	6.4	4.9	4.7	4.7	5.8	5.6
Arginine	6.8	8.2	6.2	7.0	6.3	13.5	19.2
Lysine	6.5	3.7	6.1	8.0	5.1	6.4	7.4
Histidine	1.9	0.7	0.8	1.7	3.1	3.9	2.6

2.1121

tendency for it to be lifted upward. Both these factors are influenced by the speed of the tow. Hydrodynamically, all submerged objects in motion have critical speeds, and when the drag force thus created overcomes that of lift, stalling is inevitable; this causes complete instability and violent oscillation and renders the float or elevating component useless as such, pulling the square of the trawl down and backward and tearing its meshes.

To assist in finding the solution to this problem, the author made hydrodynamic tests, using the facilities of an aircraft manufacturer. These tests showed that increasing the speed of tow has an adverse effect upon the performance of floats and elevators. That optimum performance can be achieved only with floats or kites with a high lift-to-drag ratio was made quite clear.

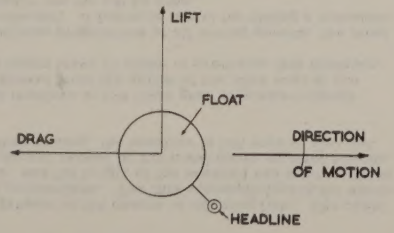

Figure 3. The forces involved

2.143

the current is switched off, staying for several minutes in a lateral or dorsal position. When the hypnosis vanishes, the fish swim away as they do in the case of direct current.

Fish within a specific area remain stunned when they are affected by pulse rates above that required to stupify them. If the pulse rates are kept below the limit that paralyzes them, the fish swim towards the anode, and when they are close to it, they become paralyzed.

The attracting effect. -- Fishing gear based on the attracting anodic effect of the electric current has been known in fresh-water fishing for many years. In most cases, the gear is homemade by fishermen and experimenters, or they have it made by electroengineers to their own design. In some cases, such gear is commercially manufactured.

The blocking or driving effect. --The blocking effect has been known for a relatively long time. In 1912, Larsen obtained a German patent on "equipment for keeping or guiding fish and other aquatic creatures into firths, bays, and rivers." The blocking or driving effect is now being used in fresh water as barriers for controlling migration, for preventing fish from being driven into turbines and pumps of hydroelectric plants and dams, for guiding fish to fish ways and into new river systems, and for fencing off water areas that are to be managed.

In sea fisheries, too, blocking can be useful. Inlets, for instance, can be fenced by an electrical barrier for keeping sea fish inside. According to present technical development, it might also be possible to drive shoals of fish at sea in a certain direction. Such gear does not, however, exist as yet.

The stunning or killing effect. --Besides the attracting and blocking or driving effect of the electrical current, its use for stunning or even killing fish has aroused the interest of the fishing industry. In sea fisheries, French fishermen are interested in an electrode to kill or paralyze sardines caught with seine nets so that the fish do not lose their scales in the dip net or on board.

An electrical line has been designed for paralyzing or killing tunas. It can be used in any fishing ground where tuna are caught by lines. It is well known that up to 50 percent of the hooked tunas may escape, and that during the long struggle on the hook, the tuna increases its lactic acid content, which greatly reduces the keeping quality of the meat. The electrical tuna line enables the tuna to be paralyzed immediately as it is hooked, sometimes even killed. It insures that the tuna will not escape, and the other disadvantages are avoided.

2.3 SANITATION IS KEY TO QUALITY CONTROL

Anonymous
Seafood Merchandising 18, 35 (April 1958)

At the 1958 Convention of the National Association of Frozen Food Packers, Lowell D. Oranger, president of the Association of Food and Drug Officials of the United States, told the assembled packers that in a food plant, nothing is more important than sanitation--and sanitation is an integral part of quality control. It must be effectively applied--not only to plant and equipment but also to ingredients, materials, and personnel. Otherwise, losses by spoilage will be incurred that may bring on regulatory action for unsanitary violations. Unsanitary plants are havens for the growth of harmful bacteria. Mr. Oranger warned that food products shipped either intrastate or interstate may be seized for contamination by filth, resulting in condemnation losses, bad publicity, and loss of consumer good will affecting the entire industry. Recommendations regarding improper sanitation and waste disposal by the state regulatory official should be followed very closely. Plants have been forced to make quick and expensive changes after failing to act on their own initiative.

Proper sanitation and good housekeeping have an important effect on personnel relations. They provide an incentive to the employee to be clean about his person in handling food. Good housekeeping goes hand in hand with safety, and efficient sanitation saves money and improves profits.

Freezing will not improve the quality of a product. A quality product results when qualified inspection personnel reject what is inferior or contaminated. Raw materials must be kept free from extraneous material, free from toxic substances, and free from harmful bacteria.

The transportation and distribution of frozen foods never having been properly regulated,

(over)

ABSTRACTER: June H. Olden

2.9 FISH PROTEINS--NUTRITIVE VALUE

Ambe, K. S. and Sohonie, K.
Indian Journal of Fisheries 4, No. 1, p. 113 (April 1957)
World Fisheries Abstracts 9, 45-46 (March-April 1958)

The isolation of proteins from shark and skate muscle has been effected and the proteins compared with a standard protein-like casein. Studies on the extraction of N by solvents like water, saline, aqueous ethanol and dilute alkali reveal that the fishes contain the maximum amount of alkali-soluble N while the salt-soluble, water-soluble and alcohol-soluble fractions get dissolved in decreasing proportions. A method of preparation of the total proteins consisting of the extraction of the proteins with dilute alkali and precipitation of the same with acetic acid is very promising, the product obtained being of a light yellow color and almost free from the fishy odor. The yield is about 10 g./100 g. of fresh fish muscle. Studies on the distribution of N indicate a high percentage of the basic amino acid fraction in the fish proteins. The percentage of N due to humin is higher while that due to ammonia is of the same order as in the casein. A semiquantitative comparison of the amino-acid make-up of the fish proteins and casein has been effected by the paper chromatographic method. The fish proteins are found to compare very favorably with the standard casein in this respect. The amounts of proline and tyrosine are correspondingly higher in the casein, whereas the proteins prepared are richer in cystine, arginine, lysine, and alanine contents.

The behavior of the proteins of shark and skate and the casein when acted upon by pepsin and trypsin, has been investigated from 3 different angles: (i) soluble N content with pepsin; (ii) rate of hydrolysis with trypsin; (iii) order of liberation of amino acids under the influence of trypsin. The fish proteins prepared are almost completely hydrolyzed to soluble components by the action of pepsin, the casein being slightly less so. There is a considerable difference between the fish proteins

(over)

Authors' summary

2.3 SOME PROBLEMS OF TRANSIENT-STATE CONDUCTION IN THE COOLING OF FISH FILLETS

Nicol, D. L. (Department of Scientific and Industrial Research, Humber Laboratory, Kingston, England)
Journal of the Science of Food and Agriculture 9, 78-82 (February 1958)

Much of the fish landed in Great Britain is shipped from the ports as fillets packed in wooden boxes. (2-stone box: 5-1/8 inches deep, holding 14 pounds fish; and 7-stone box: 7-1/2 inches deep, holding 84 pounds fish.) The fish either are iced on top only or may be iced top and bottom.

Purpose.--This study reports the time required to cool fillets from a packing temperature of 50° F. to 32° F. and involves a comparison of experimental data and theoretical calculations. The theoretical calculations were based on: (1) a general analytical equation for heat conduction in a slab of fish held at a uniform temperature and then suddenly cooled from two sides with ice and (2) Schmidt's stepwise numerical method of measuring heat conduction wherein the slab of material that is considered to be made up of a number of slices of equal thickness is cooled from either one or two sides.

Results.--Theoretical calculations and experimental results are shown to be in good agreement in the table (see over). A fast rate of cooling was observed along the sides of the boxes as a result of the melting of the ice and the flow of ice water down the sides of the box. The effect of cooling with ice from one side and from two sides is graphically presented in figures 1 and 3 (omitted). Boxes on the bottom of a 4- or 5-high stack of boxes or single boxes should cool according to the results presented in figure 3. All boxes above the bottom row should cool according to results intermediate between the results presented in figures 1 and 3.

(over)

ABSTRACTER: Max Patashnik

3.12 SOME RECENT EXPERIMENTS ON PRESERVATION OF FISH WITH TETRACYCLINE ANTIBIOTICS

Southcott, B. A.; Moyer, R.; Baker, E. G.; and Tarr, H. L. A. (Fisheries Technological Station, Vancouver, British Columbia, Canada)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations No. 110, 16-18 (April 1958)

Study number one.--In this study chlortetracycline (CTC), oxytetracycline (OTC), and tetracycline (TC) were applied to fish in various ways and compared for their effectiveness in retarding spoilage: (1) Eviscerated lingcod were iced with crushed block-ice that contained 5 parts per million (p. p. m.) of antibiotic, (2) lingcod fillets were dipped for one minute in a solution that contained 5 p. p. m. of antibiotic, and (3) whole eviscerated lingcod were stored in a 3-percent salt solution that contained 1.5 p. p. m. of antibiotic and were held at 30° to 32° F.

In this study, CTC gave greater protection than did either OTC or TC against bacterial spoilage both in lingcod that were held in ice and in lingcod fillets that were dipped in antibiotic solution. Spoilage was retarded in whole eviscerated lingcod that were held in a 3-percent salt and antibiotic solution to simulate the storage of fish in refrigerated sea water that contained antibiotics. The 3-percent salt and antibiotic solution, however, was less effective in suppressing bacterial growth than were either ice that contained antibiotics or an antibiotic dip. CTC proved more effective than either OTC or TC in refrigerated 3-percent salt solutions. Antibiotics were as effective in retarding undesirable odors as they were in suppressing bacterial growth in lingcod allowed to spoil in refrigerated salt solutions.

Study number two.--In this study, an attempt was made to determine the amounts of CTC that

(over)

ABSTRACTER: Martin Heerdt

SANITATION OF FROZEN FOODS

ICING FILLETS

AMINO ACIDS OF SHARK AND SKATE

PRESERVATION WITH ANTIBIOTICS

2.3

The temperature within a mass of fillets can be estimated and cooling rates can be calculated by the Schmidt method with accuracy on the basis of a few simple approximations. Rapid cooling requires limitations on the packing temperature and the thickness of the layer of fillets.

Temperatures (° F.) in the mid plane of a 4-inch layer of fillets cooled by ice on both sides

Time hours	Temperatures				
	Calculated		Found		
	from equation (I)	by Schmidt method	Middle	Long side[1/]	Short side[1/]
0	50	50	48	49	49
1	46.5	46	44.5	44.5	44.5
2	41.1	41	41	38	39
3	37.6	37	38.5	33	34.5
4	35.5	35	34	32	32
5	34.2	34	33.5	32	32

[1/] Two inches from edge.

2.3

temperatures during transportation, storage, and distribution have been left to the discretion of the handlers. In most instances, the regulatory official is without specific laws or regulations, and his one solution is to order the destruction of unfit frozen foods, regardless of the cause of contamination.

Every state has food laws governing food manufactured and sold within the state, and the Federal Government has food laws covering the manufacture and sale of foods that travel interstate. Federal and state regulatory officials work together through the Association of Food and Drug Officials of the United States. The purpose of this Association is to foster not only uniform laws and regulations but uniform interpretation of the various laws and regulations between states and the Food and Drug Administration. The regulatory officials are primarily concerned with the finished product at the time of purchase by consumer because a large number of these products are processed in plants outside of state jurisdiction. Mr. Oranger stated that it was the desire of the Association to have its Committee on Canned, Processed, and Frozen Foods prepare and present to its 1958 convention a model law or code to include plant sanitation, labeling, temperature, transportation, and bacteriology of frozen foods. When passed by the various states, this type of legislation will go far in producing uniformity between states in establishing the rules under which the frozen food industry will operate.

3.12

remained in the skin and flesh of halibut held under commercial conditions in sea water containing an antibiotic. Halibut that averaged about 80 pounds in weight were eviscerated and placed in tanks that contained refrigerated and circulating sea water held at 30° F. From 3 to 5 p.p.m. of CTC was added to this sea water.

The skin from halibut held in the above sea water for 10 to 19 days contained from 0.00 to 0.74 p.p.m. of CTC; whereas flesh cut from the same halibut contained from 0.00 to 0.14 p.p.m. of CTC. At the time these samples were obtained, the sea water contained 2.65 p.p.m. of CTC. Almost all of the skin samples contained small amounts of CTC, whereas 65 percent of the flesh samples did not contain CTC.

Study number three. -- Whole eviscerated salmon were dipped for one minute in a solution containing 50 p.p.m. of CTC prior to icing with ordinary ice on board a trolling vessel. The marked improvement obtained with salmon encouraged the authors to apply this procedure to black cod. Black cod is frequently subject to a considerable deterioration in quality either aboard the fishing vessel or as it is being smoked on shore. In this study, eviscerated black cod were immersed from 5 to 60 minutes in a fresh solution of sea water containing 50 p.p.m. of CTC before being iced with ordinary ice. Some 500 pounds of black cod were dipped in 30 gallons of fresh solution aboard a fishing vessel. Skin and flesh from these black cod were assayed for CTC and total bacterial count at intervals over a 17-day period of storage. Some of the skin and flesh samples were stored at 50° F. for 18 hours before bacterial counts were made.

Dipping in CTC aboard the vessel had a pronounced beneficial effect on the keeping quality of black cod after landing. The amount of CTC present in the skin and in the flesh of the dipped black cod was in the range of 0.15 to 0.22 p.p.m. and 0.09 to 0.15 p.p.m., respectively, after 12 to 17 days of storage. The authors consider this amount of CTC to be very small and believe that an assay for this antibiotic would not detect CTC after the fish had been smoked or cooked in the usual manner.

2.9

and the casein in the order in which amino acids are liberated when hydrolyzed by trypsin.

The essential amino acids in the shark and skate proteins have been assayed by standard microbiological methods. The method of evaluating the biological value from the concentrations of the essential amino acids has been applied to the test proteins. The calculated biological values of the 2 proteins are of a higher order than that of casein and suggest that these first-class proteins will be of considerable use in supplementing the deficient food proteins.

3.12 CHLORTETRACYCLINE FOR PRESERVING GULF OYSTERS

Novak, A. F.; Fieger, E. A.; and Bailey, M. E. (Louisiana State University, Baton Rouge,
Food Technology 12, 237-239 (May 1958)

Experiments were conducted on the use of chlortetracycline (CTC) for preserving fresh, ice-stored oysters and frozen oysters.

CTC-treated oysters stored in ice had lower bacterial counts after approximately 3 weeks than had untreated controls. The odor and appearance of oysters treated with a CTC wash prior to ice storage were notably superior to those washed in plain water, even though the pH values were similar. Twenty p. p. m. CTC was more effective than was ten p. p. m. CTC for bacterial inhibition. Oysters with low initial counts are better protected by CTC than are oysters with high initial counts in which some decomposition already may have occurred because of their presence.

In the test to determine bacterial counts and trimethylamine nitrogen of meats of oysters unwashed, washed in water, and washed in CTC solution (20 p. p. m.), trimethylamine nitrogen values indicated a possible application of this test, but more extensive experiments are required before the method can be evaluated as a quality test for oysters.

The use of Kelco gel for increasing retention of CTC on the surface of the oyster was unsuccessful. Oysters treated with CTC-Kelco gel dip and those packed in CTC-Kelco gel were organoleptically unacceptable after 2 weeks. Bacterial counts of the oysters processed with CTC-Kelco gel were significantly lower than were those of the control, but the oysters developed a distinct, sour taste and odor, which were attributed to the acidity of the gel.

(over)

ABSTRACTER: June H. Olden

3.26 PORTION CONTROL SEAFOODS HEAD FOR BIGGEST YEAR AS USERS JUMP ON PROFIT BANDWAGON

Anonymous
Quick Frozen Foods 20, 83-84 (May 1958)

A growing number of institutional food users are making use of the potential labor and money saving advantages of frozen portion-control foods. Institutional buyers are ordering a greater volume of frozen portion-control fish and shellfish than ever before. The reason for this is that these products provide servings that are uniform in size, are of consistent quality, and allow exact cost control. These advantages are difficult to obtain with fresh items.

Frozen portion-control fish and shellfish offer restaurants and institutions (1) complete and varied menus, (2) simplified inventory control, (3) year-around availability of seasonal items, and (4) ease of serving. In addition, these products provide less waste, more uniform quality, more convenience, and greater speed of serving. Labor costs are lower and less storage space is required for frozen portion-control fish than for other market forms of fish.

The following frozen fish and shellfish are available to restaurants and institutions: abalone patties, steaks, sticks; albacore; bass, bluefish, buffalo fish, butterfish; catfish; clams, chopped, diced, breaded, fried, sticks, strips, stuffed; cod, breaded, smoked, portioned, cakes, tongues, roe; conch; crab, meat, burgers, claws, au gratin, deviled, cakes, rolls, stuffed; croakers.

Eels, fillets, glazed; finnan haddies; fish sticks, breaded; flounders, cooked and uncooked; fish blocks, cakes, pies, roe, smoked; frog legs; gelfilte fish; haddock; hake; halibut; cutlets, fletches, steaks; herring, roe; jackfish; kingfish; kippers.

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.2495 FROZEN WHALE MEAT

Tanaka, T. and Tanaka, K.
Refrigeration, Japan 32, No. 351, p. 6 (1956)
World Fisheries Abstracts 9, 25-26 (March-April 1958)

To improve the quality of frozen whale meat, the following research has been carried out: (1) Biochemical condition of meat prior to freezing; whale meat frozen at its prerigor state or at pH > 6.2 exudes far more drip than that frozen at its postrigor state at pH >6.8, and the former frozen meat is contractile while the latter is not on thawing. In this connection, changes in the amount of drip and pH of fresh raw whale meat were measured as it was stored at 15° C. (59° F.) for 4 days. (2) Storage temperature: to obtain economical storage temperature of frozen whale meat, changes in the amount of drip (on thawing), pH, ATP level and soluble protein N of the meat during cold storage were investigated in relation to the temperature and period of storage.

In conclusion, to obtain frozen whale meat of biochemically superior quality which not only exudes a small amount of drip but also has a good taste on thawing, freezing the meat is recommended at its early stage of postrigor or at its prerigor state and remove the contractability by keeping it in a room at moderate temperature (-2° to -3° C. or 28.4° to 26.6° F.) for a short period (5 to 10 days) just before defrosting. As a practical standard for the storage temperature of frozen whale meat, allowable storage period at a given temperature may be taken as follows: up to 3 months, -10° C. (14° F.); 6 months, -15° C. (5° F.) and 12 months, -20° C. (-4° F.).

Authors' summary

3.33 A BACTERIOLOGICAL AND CHEMICAL STUDY OF CERTAIN PROBLEMS IN LOBSTER CANNING

Reed, Guilford B. and MacLeod, D. J. (Queen's University, Kingston, Canada)
Contributions to Canadian Biology 2, No. 1, 3-29 (1924)

Subjects studied. -- The subjects studied were as follows: (1) The production of discoloration by direct chemical means. (2) Bacteria of the intestines and surroundings of the lobsters concerned in protein decomposition. (3) The rate of diffusion from the lobster intestine. (4) Factors that promote the growth of hydrogen sulfide and ammonia-producing bacteria. (5) The production of hydrogen sulfide in lobster meat by bacterial action. (6) The production of ammonia and amines from lobster meat and its relation to the detinning of cans. (7) The iron content of canned lobster meat. (8) Observations on the discoloration of canned lobster meat held for various lengths of time at different stages from boiling to sterilization both before and after shelling. (9) Some effects of boiling several lots of lobsters in the same water.

Principal findings. -- The main cause of discoloration of canned lobster is decomposition of the lobster meat previous to the sterilization of the cans. Even under the best factory practice, lobster meat is heavily infected with bacteria. In as short a period as 4 hours for shelled meat and 18 to 24 hours for boiled lobster in shells, bacterial action will result in sufficient decomposition to discolor the finished product.

The decomposition leads to the production of hydrogen sulfide and volatile bases. These bases effect a gradual solution and pitting of the tinplate of the can and expose the iron, which reacts with the hydrogen sulfide.

(over)

ABSTRACTER: F. Bruce Sanford

PRESERVING GULF OYSTERS

FROZEN WHALE MEAT

PORTION-CONTROL FOODS

PROBLEMS IN LOBSTER CANNING

3.2495

3.33 (Cross Reference: 1.87, 2.01)

Sufficient acetic or citric acid should be added to render the meat in the cans slightly acid. Although this acid treatment should be looked on as an important supplementary procedure, the primary objective should be to avoid the decomposition that causes the formation of the discoloring substances. The method of avoiding this decomposition consists in reducing the time from the boiling of the live lobsters to the final sterilization.

3.12

With the exception of oysters treated with Kelco gel, all of the CTC-washed oysters from each experiment had better general appearance and odor and less off-color than did the untreated oysters, although on many occasions, this odor decreased in intensity after prolonged exposure to air. CTC did not influence the loss in weight obtained upon cooking or the general appearance of the cooked oysters.

CTC treatment also improved the acceptability of frozen Gulf oysters during a 6-month storage period, although organoleptic scores did not improve significantly.

Fewer severe dark spots were formed in oysters treated with CTC glaze, CTC wash, and CTC-Kelco gel dip than in the untreated control. CTC-glazed and CTC-washed oysters had the best odor and appearance after 6 months. Numerous off-colors developed in the untreated controls after the first 2 months and gave the liquor and some oysters a multicolored, rainbow appearance.

Conclusions.--Twenty p.p.m. CTC has merit as a preserving agent that outweighs the cost of processing Gulf oysters prior to iced or frozen storage. No disagreeable qualities developed because of inclusion of CTC. CTC might be used beneficially, since it maintains consumer acceptance of the product by preventing the development of undesirable physical qualities and is effective in such low concentrations.

3.26

Lobster, lobster meat, cakes, cocktail, curried, deviled, pies, tails; lutefisk; mackerel; mullet; mussels; oysters, breaded, cooked, minced; perch; pike; plaice; pollock; pompano; rockfish; sablefish; salmon, steaks, croquettes, smoked; sardines; scallops, breaded, natural and uniform cut fried; sea bass, steak; shad, roe; shrimp, deveined, breaded, peeled, headless, cakes, cocktail, cooked, croquettes, cutlets, patties, rolls, pies, steaks, sticks, stuffed, burgers.

Smelts, skate; snails; snappers; sole; squid; sturgeon; swellfish; trout; tuna, tuna pies; turtle meat; whale meat; whitefish; whiting.

3.331 FURTHER STUDIES ON GREEN OR OFF-COLOR CONDITION IN PRECOOKED YELLOWFIN TUNA

Naughton, John J., Frodyma, Michael M., and Zeitlin, Harry (Chemistry Department, University of Hawaii)
Special Scientific Report: Fisheries No. 247, 11 pp. (November 1957) U. S. Department of the Interior, Washington 25, D. C.

Continued work on the green or off-color condition that appear in the flesh of certain specimens of tuna on precooking has indicated the following:

1. The greenness is an actual color condition, rather than a lack of pigment or off-color.
   a. ICI (International Commission on Illumination) color evaluation of the light reflected from green meat shows it to be in the yellow-green region, with somewhat more green color than is present in normal meat.
   b. Study of spectral reflection shows generally a greater relative absorption of light in the red region of the spectrum for green meat--hence the green color--and indicates a higher concentration of a compound or mixture of compounds absorbing in this region (the green pigments).
   c. Evidence is offered for a green pigment in precooked meat that has been exposed to hemin cleavage by chemical means.
2. Spectral reflectance studies reveal oxymyoglobin and metmyoglobin as the chief pigments of raw tuna flesh. Mixtures are usually present with a high concentration of oxymyoglobin in the freshest meat, and increasing concentrations of metmyoglobin in older stored meat. Metmyoglobin content increases even on freezer storage.

(over)

Authors' summary

3.39 THE FORMATION OF MAGNESIUM-AMMONIUM-PHOSPHATE CRYSTALS IN CANNED SEA FOODS

Tanikawa, Eiichi, Nagasawa, Yoshio; and Sugiyama, Takashi (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Faculty of Fisheries, Hokkaido University 8, No. 2, 115-122 (August 1957) (In English)

VI. Influence of the contained substances upon the growth of the formed $MgNH_4PO_4 \cdot 6H_2O$ crystals in test tubes. -- The growth of struvite in canned sea foods is influenced by various substances in the juice. If the juice surrounding the canned sea food is in a colloidal solution only a few crystals will grow, and this growth will be proportional to the viscosity of the juice. To a solution of reagents prepared for the purpose of growing struvite crystals, the authors added various amounts of gelatine, glycerine, agar, edible oil, and peptone to learn the influence of the viscosity of mixed solutions upon the formation of crystals. In high viscosity solutions, struvite crystals formed slowly; whereas in low viscosity solutions they formed rapidly. The rate of growth of struvite crystals after their initial formation was rapid even in high viscosity solutions; and after long periods of storage, a few large crystals appeared. In low viscosity solutions crystals grew slowly and remained small in size. Small struvite crystals formed in solutions having a high concentration of peptone, whereas large crystals formed in solutions having a low concentration of peptone. This result is in contrast to the size of crystals formed in solutions containing gelatine, glycerine, agar, or edible oil.

VII. The formation of the separated microscopical crystal and its incipient growth. -- Ibid. 8, 123-129 (August 1957). Crystallization and the growth of struvite crystals were observed continuously under a microscope during the cooling process after heat processing. Amorphous struvite crystals usually began to form at 70° to 80°C. during the cooling of canned sea foods. Crystallization occurs at these temperatures because the solubility of the crystal is at a minimum. The temperature of

(over)

ABSTRACTER: Martin Heerdt

GREENING OF TUNA

STRUVITE IN CANNED SEA FOODS

3.39 THE FORMATION OF MAGNESIUM-AMMONIUM-PHOSPHATE CRYSTALS IN CANNED SEA FOODS

Tanikawa, Eiichi, Nagasawa, Yoshio; and Sugiyama, Takashi (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Faculty of Fisheries, Hokkaido University 8, No. 3, 195-209 (November 1957) (In English)

IX. Method for preventing the formation of the crystals during the processing of the cans. -- Even rapid cooling of the can after heat processing did not completely prevent the formation of struvite crystals; therefore, in this study the authors attempted to prevent the formation of struvite crystals by the addition of varying amounts of sodium hexametaphosphate; Mascolin M, a brand of sodium hexametaphosphate; Mascolin T, another brand of sodium hexametaphosphate; and ethylenediamine tetraacetate (EDTA) to crab and salmon prior to canning. Formation of struvite crystals was prevented in canned crab meat or canned salmon that had received 0.11 to 0.22 percent of sodium hexametaphosphate, 0.1 to 0.28 percent of Mascolin M or Mascolin T, and 0.34 to 0.67 percent EDTA. Canned crab meat with more than 0.11 percent of added sodium hexametaphosphate became pale yellow in color, bitter to taste, and possessed an off-white precipitate, all of which lowered its merchandise value. Canned salmon that had received more than 0.28 percent of Mascolin M became pale brown in color, elastic in texture, and did not crumble properly. Canned salmon that had received Mascolin T in excess of 0.28 percent became discolored and pale. With less than this amount of Mascolin T the incidence of formation of visible struvite crystals increased.

X. General consideration. -- Ibid. 8, 210-213 (November 1957). Chemical components of magnesium and phosphate that are contained in canned fish, and ammonium that is generated from fish muscle protein are combined during heat processing to produce a compound that crystallizes out during slow cooling as large crystals. These crystals continue to grow in size during storage at

(over)

ABSTRACTER: Martin Heerdt

STRUVITE IN CANNED SEA FOOD

6.3 A NOTE ON THE ORGANIC CONSTITUTION OF PACIFIC COAST KELPS

Berkeley, C.
Contributions to Canadian Biology 2, No. 19, 503-506 (1925)

Macrocystis pyrifera. -- In 1917, the author investigated the fermentation of Macrocystis pyrifera. The objective was the production of acetic acid and other fatty acids from which acetone and a series of other ketone compounds were made. In order that the efficiency of the fermentation process could be determined, it was necessary to have a knowledge of the carbohydrate constituents of the plant.

It was found that the methyl-pentosan and pentosan complexes were the only carbohydrate constituents present in any significant quantity in the plant. No hexoses or hexose derivatives could be detected.

Nereocystis lutkeana. -- A preliminary investigation of the corresponding components of Nereocystis lutkeana by the author showed them to be of an entirely different nature.

In common with the dried leaf material of Macrocystis, that of Nereocystis contains no free sugar or starch but yields reducing sugar on acid hydrolysis. Nereocystis, unlike Macrocystis, gives a positive levulinic acid test when it is heated with 20 percent hydrochloric acid, showing the presence of hexose compounds. It also gives a positive mucic acid test on treatment with 25 percent nitric acid, indicating the presence of a galactose derivative.

Extraction with a 2-percent solution of sodium carbonate and neutralization of the extract, or precipitation by alcohol, yields a mixture of pentosan and galactan containing only a trace of

(over)

ABSTRACTER: F. Bruce Sanford

CONSTITUTION OF PACIFIC KELPS

3.39

crystallization of microcrystals of struvite having a regular surface and shape was found to be at 60° to 70° C. If the rate of cooling is slow, the rate of growth of the struvite crystals is fast. Conversely, if the rate of cooling is fast, the rate of growth of the struvite crystals is slow.

VIII. The formation of the crystals during the processing of the cans.--Ibid. 8, 130-146 (August 1957). Even if various kinds of water and salt solutions were used for cooking crab meat in the shell, the amount of dissolved magnesium that resulted in the can of canned crab meat prepared from this cooked crab did not exceed 0.0028 percent. The loss of magnesium from crab meat by boiling was about 26 percent. By cooking crab in sea water, the authors were able to remove twice as much magnesium and phosphate from the meat as they were able to remove by cooking crab in a barium chloride or calcium chloride solution made with distilled water.

If canned sea foods are cooled slowly so that they remain in the temperature range 50° to 30° C., the struvite crystals that form are comparatively large and few. If canned sea foods are cooled rapidly through the temperature range 50° to 30° C., the struvite crystals that form are comparatively small in size and numerous. The formation of struvite crystals in canned sea foods was found to depend upon the freshness of the raw material. Struvite crystals that formed in canned sea foods prepared from unfresh raw material were small in size and more numerous than struvite crystals that formed in canned sea foods prepared from fresh raw material. Differences in struvite crystal formation caused by the degree of freshness of the raw material or by the use of a particular kind of water for boiling the fresh crab were smaller than the differences in struvite crystal formation caused by the rate of cooling. Sea water as a cooking medium for the fresh crab produces a better quality of canned crab than does fresh water.

6.3

methyl-pentosan. After exhaustive extraction with alkali, a residue remains that gives the characteristic reactions of cellulose, after repeated treatment with bromine water. Finally, the aqueous extract of Nereocystis, on evaporation and extraction of the residue with alcohol, yields a crystalline substance that can be obtained pure by repeated recrystallization from 75 percent alcohol.

This substance, when pure, melts at 164° (uncorrected). It is a strongly dextrorotary in borax solution but practically inactive in aqueous solution. It gives a positive iodoform test. It does not reduce Fehling's solution, either before or after being boiled with hydrochloric acid, but gives a strongly reducing solution after being warmed with 30 percent nitric acid. A phenylosazone, melting at 197° (uncorrected), is obtained from this solution after neutralization, evaporation, and subsequent extraction with alcohol. The substance yields a benzaldehyde derivative, melting at 213° (uncorrected), and an acetaldehyde derivative melting at 169° (uncorrected). These tests point to the identity of the substance with the sugar-alcohol, d-mannitol.

This compound does not occur in Macrocystis pyrifera. It has been found in other species of Laminariaceae, however, and is known to occur in other marine algae.

3.331

3. The reactions of the pigments in situ in the raw tuna flesh were studied by reflectance methods and revealed the following:

a. Interconversion from oxy- to met- to myoglobin, and reverse were readily achieved by chemical means.
b. Metmyoglobin was found to be very soluble in aqueous media while oxymyoglobin was not easily extracted into the same media.
c. Oxymyoglobin was converted to metmyoglobin on deaeration.
d. Stored meat showed evidence of progressive denaturation of the pigment protein.

4. The characteristics of the pigments of cooked tuna flesh were investigated. One of the pigments, denatured globin hemichrome, was readily reduced to the hemochrome by chemical means.

5. Evidence is presented showing a relation between high metmyoglobin in the raw flesh and a tendency towards discoloration on precooking.

6. Data are cited indicating a low fat peroxide content in normal meat relative to meat inclined to become off-color on precooking. It is felt that fat oxidation and heme pigment oxidation are interrelated.

The conclusion reached is that greening in tuna flesh is similar to the greening process that occurs in other meats, and is due to an anomalous heme protein oxidation. A hypothetical pathway for the production of the green condition in tuna flesh is outlined.

3.39

comparatively high temperatures. The solubility and shape of the crystals in the test tubes are influenced by temperature. Maximum crystal solubility occurs at 50° to 60° C. Above 50° C. the shape of the crystals is amorphous, whereas below 50° C. the shape of the crystals is needle-like with regular facets. Crystals that form below 50° to 30° C. are large in size and have beautiful regular facets. As the temperature of the canned sea food during cooling, passes through the zone of crystal formation, small and numerous crystals are formed. Rapid cooling followed by a low temperature of storage is required to keep these crystals small.

In canned sea foods with a pH below 4, the formation of struvite crystals is inhibited because their solubility increases as the pH decreases. The addition of acid may be used to prevent struvite crystal formation provided the taste is not harmed. The ionic concentration of the magnesium, ammonium, and phosphate that are needed for crystal formation also influences the formation of crystals. This is especially true of magnesium.

In canned foods such as mackerel, saury, salmon, and other fish that have juice of high viscosity, the size of the crystals that are formed is small because crystallization is slow in juices of high viscosity. Once these crystals are formed, however, they may attain a large size. The presence of only a few crystals in canned mackerel or canned saury is probably due to the low magnesium, ammonium, and phosphate content in relation to the large amount of juice and to the mixing of these substances by the rapid transfer of heat in the juice during cooling. The most important factors for crystal formation, therefore, are temperature and concentration of the substances needed for the formation of struvite crystals. The formation of struvite crystals in canned sea foods is inevitable; however, every attempt should be made to keep them to a size that is invisible.

Even if fresh water is used for cooking the crab prior to canning, the amount of magnesium in the raw fish material is sufficient to permit the formation of struvite crystals. The authors recommend (1) the use of a complexing agent such as sodium hexametaphosphate to prevent the formation of crystals in canned sea foods and (2) the use of only the minimum amount of complexing agent necessary to control crystal formation because even this amount may influence the flavor of the canned sea food and the health of human beings.

3.335 METHODS FOR CANNING SUCKERS

Anonymous
Trade News 10, 16 (April 1958)

Despite the fact that they are the fish on which thousands of tyro anglers figuratively cut their eye teeth, the white sucker is not generally held in high regard as a table item. Yet, according to the Fisheries Research Board of Canada, this ubiquitous species makes a palatable "canner" fish if properly processed.

White suckers yield a palatable canned product, because the bones are softened to the point where they are no longer noticeable and the flesh is flaky and sweet.

The cleaning procedure is simple: the scales are removed by means of a hand-held scaling brush, the head and guts are removed, the fish is washed thoroughly in clean water to remove blood and loose particles, and the fish is cut up into portions suitable for filling one-half pound flat cans. Enameled cans should be used.

A teaspoonful of salt is added to each can containing the proper weight of fish; the cans are then placed, without covers in a container where they may be steamed for 30 to 60 minutes. After this "exhausting" period is over, the lids are put on the cans and the cans are sealed. They are then placed in a retort (pressure cooker) with a steam pressure up to 10 to 11 pounds (240° F.) and are processed at this temperature for 75 minutes. Next the heat is turned off and the cans are allowed to cool to room temperature.

For human consumption, it is customary to remove the viscera before canning except for very

(over)

 Reprinted in part

6.55 A BREED DIFFERENCE WITH RESPECT TO CARRY-OVER EFFECT OF UNIDENTIFIED GROWTH FACTORS

Lillie, Robert J.; Menge, Henry; Miner, James J.; and Denton, C. A. (Animal Husbandry Research Division, U. S. Department of Agriculture, Beltsville, Maryland)
Poultry Science 37, 344-352 (March 1958)

In 1951, studies were begun to determine what effect unidentified factors present in fishery by-products and in other supplements incorporated in breeder diets containing vitamin B_{12} would have on the progeny performance.

Data accumulated in a 5-year study indicate that under the authors' experimental conditions, a breed difference exists with respect to the carry-over effect of an unidentified fish-solubles growth factor in the hen's diet to the progeny. The fact that New Hampshire White Leghorn crossbred progeny responded to a combination of fish solubles and vitamin B_{12} in both maternal and chick diets, whereas the Rhode Island Red and New Hampshire purebred progeny and the New Hampshire Barred Rock crossbred progeny did not, suggests that the New Hampshire White Leghorn crossbred chicks appear to be more sensitive to the unidentified fish-solubles growth factor than do the progeny of other breeds under study. White Leghorns have been reported to be more efficient than are New Hampshires in transmitting riboflavin and thiamine from fish solubles in the hen's diet to the egg. In this connection, the possibility exists that the particular strain of Leghorns used in the authors' study was more efficient than were the heavy breeds in utilizing the fish-solubles growth factor. White Leghorns used by other investigators, however, did not exhibit any carry-over effect from the dam to her progeny, although the same breed did so in still another study. Rhode Island Reds, New Hampshires, and Barred Rocks failed to show any evidence of a fish-solubles growth factor transmission to the progeny under the experimental conditions, but such evidence was reported by investigators with broiler-type White Rocks, New Hampshires, and others.

(over)

 ABSTRACTER: June H. Olden

7.589 THE ESTIMATION OF FREE SUGARS IN SKELETAL MUSCLE OF CODLING (GADUS CALLARIAS) AND HERRING (CLUPEA HARENGUS)

Jones, N. R. (Torry Research Station, Aberdeen, Scotland)
The Biochemical Journal 68, 704-708 (April 1958)

This study described the effects of various procedures on the recovery of free sugars from extracts of cod muscle and herring muscle. The study also reports the danger of impurities, which may affect the sugar analysis of other biological extracts and fluids.

Experimental materials. --Codling used in this study were landed alive and maintained alive in aerated sea water until killed by a blow on the head. Codling were gutted and packed in ice at 2.5° C. for use in post-mortem studies. Sterile codling muscle was dissected under aseptic conditions from the anterio-dorsal part of the fillet immediately after death. Small samples of muscle tissue for studies on autolysis were stored in sealed petri dishes at 0° C. Herring, 14 to 20 hours dead and stored at about 0° C., were obtained from the Marine Laboratory in Aberdeen, Scotland, for use in this study.

Experimental methods. -- Trichloroacetic acid extracts of muscle were obtained by macerating 10-gram (gm.) muscle samples in 30 milliliters (ml.) of 10 percent weight per volume of trichloroacetic acid and centrifuging to recover the liquid. Ethanol extracts were obtained by macerating 10 gm. of muscle in 32 ml. of ethanol and extracting the residue 3 times with 80 percent volume per volume of ethanol to obtain a total extract volume of 250 ml. Chloroform-separated extracts were obtained by adding 3:1 volume per volume of chloroform-to-ethanol extracts as prepared above. The upper aqueous phase contained the free sugar. Lyophilization was carried out over P_2O_5 in a centrifugal freeze-drying apparatus. Somogyi's method was used to extract reducing sugars. The extracts

(over)

 ABSTRACTER: Martin Heerdt

7.61 THE ADSORPTION OF VITAMIN A FROM FISH LIVER OILS

Swain, Lyle A. (Pacific Fisheries Experimental Station, Vancouver, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 6, No. 2, 113-118 (August 1943)

The Tswett adsorption column has come into frequent use in the separation and purification of the components of a mixture. Its efficiency lies in the fact that the adsorptive forces between a dissolved substance and an adsorbent may be varied by changes in the adsorbent, changes in the solvent, or changes in the molecule of the dissolved substance.

Changes in the effectiveness of the adsorbent are possible either by exchanging one substance for another or by different treatments of any one substance. Seventy-one materials were examined in the present work and 10 showed definite adsorption of vitamin A alcohol.

Changes in the solvent modify the adsorption process because solvents differ greatly in their "eluting power." The order of effectiveness of the eluting solvent is independent of the adsorbate or adsorbent used.

The chemical structure of the adsorbate has an important effect upon the ease of its adsorption. The more polar it is, the more readily it is adsorbed. Unsaturated compounds are more readily adsorbed than are their saturated homologues. Conjugation of the double bonds also increases adsorption. Increasing numbers of hydroxyl groups in a molecule increase the ease of adsorption of a molecule, and a hydroxyl group is more conducive to adsorption than is unsaturation.

In the present work, the author found that the alcohol form of vitamin A is more easily adsorbed than are its esters. It is also more easily adsorbed than are glyceryl and other esters of fatty acids.

(over)

 ABSTRACTER: F. Bruce Sanford

CANNING SUCKERS

GROWTH FACTOR TRANSMISSION

FREE SUGARS IN COD MUSCLE

ADSORPTION OF VITAMIN A FROM FISH OILS

6.55

Since dried egg yolk was fed only in one trial to White Leghorns, no evidence is available on the carry-over effect of the egg-yolk factor among the heavy breeds.

Further study is needed to clarify the discrepancies obtained from various research laboratories. Most of the discrepancies may be attributed to the composition of maternal and chick diets, breed and strain of chickens used, pure breeding versus crossbreeding, stress factors, management, and feeding principles of the breeding stock and progeny.

Summary.--A 5-year study with Rhode Island Reds, New Hampshires, Barred Rocks, and White Leghorns maintained on wire floors or in laying batteries and fed an all-vegetable protein diet supplemented with vitamin B_{12} warrants the following conclusions: (1) The incorporation of fish solubles or a fish-solubles fraction in the maternal diet conferred no benefit on the progeny performance of purebred progeny from Rhode Island Red and New Hampshire matings or of crossbred progeny from New Hampshire Barred Rock matings. Such a benefit was conferred, however, among the crossbred progeny from New Hampshire White Leghorn matings. Although the differences were small, they were found to be statistically significant at the 5-percent level and the 1-percent level in the first and second trials, respectively. (2) The incorporation of dried egg yolk in the maternal diet of White Leghorn hens mated to New Hampshire males resulted in a significant growth response in the Crossbred progeny at the 1-percent level. (3) The incorporation of fish solubles or a fish-solubles fraction in the maternal diet did not confer any consistent benefit on egg production in four out of five experiments. In one experiment, the presence of fish solubles resulted in a slight depression in egg production.

7.61

It is apparently slightly easier to elute than are some other components of the unsaponifiable matter of dogfish liver oil (Squalus suckleyi), and the vitamin A esters are less readily adsorbed than are the triglycerides.

3.335

small fish such as sardines. For pet food, the viscera may be left in, but sanitary and processing procedures are exactly the same.

For a limited production a hand-operated canning machine of the type used for home canning would be suitable. Pressure cookers come in different sizes and may be used over an ordinary gas or electric range.

The container for exhausting may be a boiler or stock pot, with cover, or the pressure cooker can be used with exhaust valve left open. For ease of operations, both boiler and retort should hold approximately the same number of cans.

7.599

mentioned above were chromatographed (1) directly, (2) as electrolytically desalted extracts, and (3) as extracts after removal of salt and amino compounds by ion-exchange resin. Resins used in this study were Amberlite IR-120, IR-4B, Dowex 50, Dowex 2, sulphonated polystyrene, nominal divinyl 4.5 percent PSX, and De-Acidite FF. Sugar chromatograms were evaluated after (1) drying at 60° C. and (2) spraying both sides with aniline hydrogen phthalate-butanol. Amino acids were estimated by two-dimensional chromatography and ninhydrin spot-elution.

Results.--Ribose obtained in extracts of herring and codling muscle reacted readily with nitrogenous constituents that were being chromatographed. Glucose was stable. Electrolytic desalting interfered with the estimation of ribose. The hydrogen form of sulphonated-polystyrene resins will hydrolyze adenosine at room temperature. The amount of error introduced in muscle analyses as a result of this hydrolysis was insignificant. The removal of salt and amino nitrogen by suitable mixed ion-exchange resins followed by lyophilizing and quantitative chromatography provided a method for estimating glucose and ribose in codling and herring muscle with an accuracy of ± 6 percent

3.335 METHODS FOR CANNING SUCKERS

Anonymous
Trade News 10, 16 (April 1958)

Despite the fact that they are the fish on which thousands of tyro anglers figuratively cut their eye teeth, the white sucker is not generally held in high regard as a table item. Yet, according to the Fisheries Research Board of Canada, this ubiquitous species makes a palatable "canner" fish if properly processed.

White suckers yield a palatable canned product, because the bones are softened to the point where they are no longer noticeable and the flesh is flaky and sweet.

The cleaning procedure is simple: the scales are removed by means of a hand-held scaling brush, the head and guts are removed, the fish is washed thoroughly in clean water to remove blood and loose particles, and the fish is cut up into portions suitable for filling one-half pound flat cans. Enameled cans should be used.

A teaspoonful of salt is added to each can containing the proper weight of fish; the cans are then placed, without covers in a container where they may be steamed for 30 to 60 minutes. After this "exhausting" period is over, the lids are put on the cans and the cans are sealed. They are then placed in a retort (pressure cooker) with a steam pressure up to 10 to 11 pounds (240° F.) and are processed at this temperature for 75 minutes. Next the heat is turned off and the cans are allowed to cool to room temperature.

For human consumption, it is customary to remove the viscera before canning except for very

(over)

 Reprinted in part

6.55 A BREED DIFFERENCE WITH RESPECT TO CARRY-OVER EFFECT OF UNIDENTIFIED GROWTH FACTORS

Lillie, Robert J.; Menge, Henry; Miner, James J.; and Denton, C. A. (Animal Husbandry Research Division, U. S. Department of Agriculture, Beltsville, Maryland)
Poultry Science 37, 344-352 (March 1958)

In 1951, studies were begun to determine what effect unidentified factors present in fishery by-products and in other supplements incorporated in breeder diets containing vitamin B_{12} would have on the progeny performance.

Data accumulated in a 5-year study indicate that under the authors' experimental conditions, a breed difference exists with respect to the carry-over effect of an unidentified fish-solubles growth factor in the hen's diet to the progeny. The fact that New Hampshire White Leghorn crossbred progeny responded to a combination of fish solubles and vitamin B_{12} in both maternal and chick diets, whereas the Rhode Island Red and New Hampshire purebred progeny and the New Hampshire Barred Rock crossbred progeny did not, suggests that the New Hampshire White Leghorn crossbred chicks appear to be more sensitive to the unidentified fish-solubles growth factor than do the progeny of other breeds under study. White Leghorns have been reported to be more efficient than are New Hampshires in transmitting riboflavin and thiamine from fish solubles in the hen's diet to the egg. In this connection, the possibility exists that the particular strain of Leghorns used in the authors' study was more efficient than were the heavy breeds in utilizing the fish-solubles growth factor. White Leghorns used by other investigators, however, did not exhibit any carry-over effect from the dam to her progeny, although the same breed did so in still another study. Rhode Island Reds, New Hampshires, and Barred Rocks failed to show any evidence of a fish-solubles growth factor transmission to the progeny under the experimental conditions, but such evidence was reported by investigators with broiler-type White Rocks, New Hampshires, and others.

(over)

 ABSTRACTER: June H. Olden

7.599 THE ESTIMATION OF FREE SUGARS IN SKELETAL MUSCLE OF CODLING (GADUS CALLARIAS) AND HERRING (CLUPEA HARENGUS)

Jones, N. R. (Torry Research Station, Aberdeen, Scotland)
The Biochemical Journal 68, 704-708 (April 1958)

This study described the effects of various procedures on the recovery of free sugars from extracts of cod muscle and herring muscle. The study also reports the danger of impurities, which may affect the sugar analysis of other biological extracts and fluids.

Experimental materials.--Codling used in this study were landed alive and maintained alive in aerated sea water until killed by a blow on the head. Codling were gutted and packed in ice at 2.5° C. for use in post-mortem studies. Sterile codling muscle was dissected under aseptic conditions from the anterio-dorsal part of the fillet immediately after death. Small samples of muscle tissue for studies on autolysis were stored in sealed petri dishes at 0° C. Herring, 14 to 20 hours dead and stored at about 0° C., were obtained from the Marine Laboratory in Aberdeen, Scotland, for use in this study.

Experimental methods.--Trichloroacetic acid extracts of muscle were obtained by macerating 10-gram (gm.) muscle samples in 30 milliliters (ml.) of 10 percent weight per volume of trichloroacetic acid and centrifuging to recover the liquid. Ethanol extracts were obtained by macerating 10 gm. of muscle in 32 ml. of ethanol and extracting the residue 3 times with 80 percent volume per volume of ethanol to obtain a total extract volume of 250 ml. Chloroform-separated extracts were obtained by adding 3:1 volume per volume of chloroform-to-ethanol extracts as prepared above. The upper aqueous phase contained the free sugar. Lyophilization was carried out over P_2O_5 in a centrifugal freeze-drying apparatus. Somogyi's method was used to extract reducing sugars. The extracts

(over)

 ABSTRACTER: Martin Heerdt

7.61 THE ADSORPTION OF VITAMIN A FROM FISH LIVER OILS

Swain, Lyle A. (Pacific Fisheries Experimental Station, Vancouver, British Columbia, Canada)
Journal of the Fisheries Research Board of Canada 6, No. 2, 113-118 (August 1943)

The Tswett adsorption column has come into frequent use in the separation and purification of the components of a mixture. Its efficiency lies in the fact that the adsorptive forces between a dissolved substance and an adsorbent may be varied by changes in the adsorbent, changes in the solvent, or changes in the molecule of the dissolved substance.

Changes in the effectiveness of the adsorbent are possible either by exchanging one substance for another or by different treatments of any one substance. Seventy-one materials were examined in the present work and 10 showed definite adsorption of vitamin A alcohol.

Changes in the solvent modify the adsorption process because solvents differ greatly in their "eluting power." The order of effectiveness of the eluting solvent is independent of the adsorbate or adsorbent used.

The chemical structure of the adsorbate has an important effect upon the ease of its adsorption. The more polar it is, the more readily it is adsorbed. Unsaturated compounds are more readily adsorbed than are their saturated homologues. Conjugation of the double bonds also increases adsorption. Increasing numbers of hydroxyl groups in a molecule increase the ease of adsorption of a molecule, and a hydroxyl group is more conducive to adsorption than is unsaturation.

In the present work, the author found that the alcohol form of vitamin A is more easily adsorbed than are its esters. It is also more easily adsorbed than are glyceryl and other esters of fatty acids.

(over)

 ABSTRACTER: F. Bruce Sanford

CANNING SUCKERS

GROWTH FACTOR TRANSMISSION

FREE SUGARS IN COD MUSCLE

ADSORPTION OF VITAMIN A FROM FISH OILS

6.55

Since dried egg yolk was fed only in one trial to White Leghorns, no evidence is available on the carry-over effect of the egg-yolk factor among the heavy breeds.

Further study is needed to clarify the discrepancies obtained from various research laboratories. Most of the discrepancies may be attributed to the composition of maternal and chick diets, breed and strain of chickens used, pure breeding versus crossbreeding, stress factors, management, and feeding principles of the breeding stock and progeny.

Summary.--A 5-year study with Rhode Island Reds, New Hampshires, Barred Rocks, and White Leghorns maintained on wire floors or in laying batteries and fed an all-vegetable protein diet supplemented with vitamin B_{12} warrants the following conclusions: (1) The incorporation of fish solubles or a fish-solubles fraction in the maternal diet conferred no benefit on the progeny performance of purebred progeny from Rhode Island Red and New Hampshire matings or of crossbred progeny from New Hampshire Barred Rock matings. Such a benefit was conferred, however, among the crossbred progeny from New Hampshire White Leghorn matings. Although the differences were small, they were found to be statistically significant at the 5-percent level and the 1-percent level in the first and second trials, respectively. (2) The incorporation of dried egg yolk in the maternal diet of White Leghorn hens mated to New Hampshire males resulted in a significant growth response in the Crossbred progeny at the 1-percent level. (3) The incorporation of fish solubles or a fish-solubles fraction in the maternal diet did not confer any consistent benefit on egg production in four out of five experiments. In one experiment, the presence of fish solubles resulted in a slight depression in egg production.

7.61

It is apparently slightly easier to elute than are some other components of the unsaponifiable matter of dogfish liver oil (Squalus suckleyi), and the vitamin A esters are less readily adsorbed than are the triglycerides.

3.335

small fish such as sardines. For pet food, the viscera may be left in, but sanitary and processing procedures are exactly the same.

For a limited production a hand-operated canning machine of the type used for home canning would be suitable. Pressure cookers come in different sizes and may be used over an ordinary gas or electric range.

The container for exhausting may be a boiler or stock pot, with cover, or the pressure cooker can be used with exhaust valve left open. For ease of operations, both boiler and retort should hold approximately the same number of cans.

7.599

mentioned above were chromatographed (1) directly, (2) as electrolytically desalted extracts, and (3) as extracts after removal of salt and amino compounds by ion-exchange resin. Resins used in this study were Amberlite IR-120, IR-4B, Dowex 50, Dowex 2, sulphonated polystyrene, nominal divinyl 4.5 percent PSX, and De-Acidite FF. Sugar chromatograms were evaluated after (1) drying at 60° C. and (2) spraying both sides with aniline hydrogen phthalate-butanol. Amino acids were estimated by two-dimensional chromatography and ninhydrin spot-elution.

Results.--Ribose obtained in extracts of herring and codling muscle reacted readily with nitrogenous constituents that were being chromatographed. Glucose was stable. Electrolytic desalting interfered with the estimation of ribose. The hydrogen form of sulphonated-polystyrene resins will hydrolyze adenosine at room temperature. The amount of error introduced in muscle analyses as a result of this hydrolysis was insignificant. The removal of salt and amino nitrogen by suitable mixed ion-exchange resins followed by lyophilizing and quantitative chromatography provided a method for estimating glucose and ribose in codling and herring muscle with an accuracy of ± 6 percent

6.193 A COMPARISON OF UNIDENTIFIED GROWTH FACTOR SOURCES FOR TURKEYS AND INFLUENCE OF CALORIE-PROTEIN RATIO ON RESPONSE

Donovan, G. A.; Warden, W. K.; and Reynolds, W. M. (Terre Haute, Indiana)
Poultry Science 37, 422-428 (March 1958)

In the first experiment, supplementation of a vegetable protein ration, complete in all known nutrients, with 0.15 percent or 0.30 percent of a fermentation product supplying unidentified growth factors (UGF) increased early poult growth by 7.0 percent and 7.3 percent, respectively. Ten percent fish meal plus 3 percent dried whey included on an iso-protein, -calcium, -phosphorus basis, increased growth by 2.4 percent. The growth response obtained from a combination of the fermentation product and fish and whey was no greater than that obtained from the fermentation product alone.

Inclusion of six natural sources of UGF (fish meal, fish solubles, dried whey, dried corn distillers solubles, dried brewers yeast and meat scrap) enhanced growth by 2.4 percent. When 0.3 percent of the fermentation product also was included with the other six sources, growth was improved by 6.1 percent above the ration containing no special UGF source.

In the second experiment the birds were carried to market age. The basal, formulated to be as economical as possible, contained 3 percent meat scrap, a moderate source of UGF. Supplementation with 0.15 percent of the fermentation product brought about consistent increases in growth of 2.8 percent, 1.6 percent, and 2.5 percent at 8, 16, and 24 weeks of age, respectively. The 24-week increase was the only one that was statistically significant. The use of 2 percent fish meal had no effect upon growth rate at 8 and 16 weeks, but at 24 weeks there was a slight improvement (0.06 percent). Supplementing the basal with 10 percent wheat middlings, 5 percent fish meal and 3 percent dried whey gave no additional growth promoting effect.

(over)

Authors' summary

8.42 THE INORGANIC COMPOSITION OF BROWN TROUT BLOOD

Phillips, Arthur M., Jr. and Brockway, Donald R. (Bureau of Sport Fisheries and Wildlife and New York Conservation Department, Cortland, New York)
The Progressive Fish-Culturist 20, 58-61 (April 1958)

The chemical composition of the blood of many species of higher animals is well known. This information has been invaluable in basic studies of animal physiology, in diagnosing pathological conditions, in establishing normal metabolism of the food of the animals, and in studying and culturing disease organisms afflicting higher animals. Studies of the chemical composition of fish blood in general are fragmentary and almost nonexistent for trout blood.

Samples of blood were withdrawn from 2-year-old brown trout. Brown trout of this age were large enough to assure adequate blood samples but were too young to spawn during the year. Avoidance of spawning was considered important because it was desired to preclude abnormal blood composition caused by sexual activity. The trout averaged approximately 300 grams in weight. To assure standard conditions at the time of sampling for blood, the fish were fed at 4 p.m. the day before their experimental use and the samples of blood were taken the next day at 7 a.m. before the fish were fed. This practice made it possible to avoid the changes in blood chemistry that might have occurred if digestion and absorption of food had been at a peak when the blood was sampled. For a complete series of analyses, relatively large samples of blood were required and it was necessary to pool the blood from individual fish until a total volume of 25 cubic centimeters of blood was obtained. The pooled blood sample was allowed to clot, and the serum was recovered.

The serum was analyzed for iron, chloride, sodium, magnesium, potassium, calcium, phosphorus, and sulfate. In addition to the serum analyses, copper and iron were determined on whole brown trout blood.

The results are summarized in the table.

See table, over.

(over)

ABSTRACTER: Kathryn L. Osterhaug

7.86 BASIC PRINCIPLES AND INSTRUMENTATION. CHAPTER V. KINESTHETICS--TEXTURE

Kramer, Amihud and Twigg, Bernard A. (University of Maryland)
Canner and Freezer 126, 14-17, 39 (April 14, 1958)

Textural or kinesthetic characteristics deal with the sense of feel. The problem therefore is to find physical instruments or chemical procedures that will simulate and measure the sensations the consumer experiences through his sense of feel, with his fingers, and more particularly with his mouth.

Some of these sensory characteristics are listed as follows:

1. Finger feel.--(a) Firmness, as encountered by the consumer selecting a firm apple, measured physically by compression. (b) Softness, or yielding quality, as in selecting a peach or plum, measured physically by compression. (c) Juiciness, as in immature sweet corn where the thumbnail is used to test the ease and amount of juice squeezed out of a kernel, measured physically by puncturing, or juice extraction.

2. Mouth feel.--(a) Chewiness, as sensed by the resistance of the product to compression and shearing action of the teeth. (b) Fibrousness, as sensed by the presence of an inedible residue remaining in the mouth after mastication as well as by resistance to cutting force of the teeth. (c) Grittiness, as sensed by the presence of small grit particles, such as sand, or stone cells. (d) Mealiness, as sensed by the coating of starch or other material with adhesive properties over mouth tissues. (e) Stickiness, as sensed by the mouth while chewing foods with adhesive properties.

In general, these factors lend themselves readily to objective measurements by the use of mechanical instruments. Thus, a considerable array of tenderometers, texturemeters, puncturemeters,

(over)

ABSTRACTER: Kathryn L. Osterhaug

8.51 THE YIELD OF INSULIN FROM FISH

McCormick, N. A. and Noble, E. C. (Marine Biological Laboratory, St. Andrews, New Brunswick, and the University of Toronto, Canada)
Contributions to Canadian Biology 2, No. 7, 117-127 (1924)

MacLeod has demonstrated that insulin is present in the pancreas of certain Elasmobranchii (Squalus and Raja) and in the principal islets of certain Teleostei (Myoxocephalus and Lophius), and that it can be extracted from these tissues by comparatively inexpensive methods. Clinical trials have shown it to be entirely satisfactory for use in man.

In the present investigation, the observations have been extended over a wider range of fishes.

The procedure was to test in the usual manner, on normal rabbits, extracts prepared from the islets, or pancreas, of the following species: (1) flounder (Pseudopleuronectes americanus), (2) sea raven (Hemitripterus americanus), (3) eel pout (Zoarces anguillaris), (4) shark (Prionace glauco and Somniosus microcephalus), (5) lump fish (Cyclopterus lumpus), (6) haddock (Melanogrammus aeglefinus), (7) hake (Merluccius bilinearis), (8) cod (Gadus callarias), (9) pollock (Pollachius virens), and (10) halibut (Hippoglossus hippoglossus). The extracts prepared from certain of these fish were subjected to further purification and then were tested clinically.

Data on the cod with conditions of collection omitted are given in the accompanying table.

See table, over.

(over)

ABSTRACTER: F. Bruce Sanford

7.86

succulometers, fibrometers, and pressure testers are available.

Many of the sensations have in common the principle of resistance to force, so that in general, the unit of measurement may be in terms of pounds force. This force may be applied in a number of ways or through a combination of two or more of these methods including: (1) compression, (2) shearing, (3) cutting, (4) tensile strength, and (5) shear-pressure.

The relations of these consumer sensations (sensory) to the physical methods of application of force (physical) are summarized in table 1, together with some of the instruments and procedures that have been suggested as methods of measuring these characteristics.

Table 1.--Relation of kinesthetic characteristics to physical methods of application of force.

Sensory	Physical	Instruments or procedures
Firmness	compression	pressure tester, shear-press
Yielding quality	compression	pressure tester, shear-press
Juiciness	compression (juice extraction)	puncture tester, succulometer, shear-press, moisture tests
Chewiness	shear-pressure	tenderometers, texturemeter, shear-press, A.I.S., specific gravity tests
Fibrousness	cutting, comminuting	fibrometer, shear-press, fiber analysis
Grittiness	- - -	comminution, elution, sedimentation tests
Mealiness	- - -	starch, gum analysis
Stickiness	tensile strength	jelly strength tester, pectin gum analysis

8.51 (Cross Reference: 6.72)

Fish and Collector	No. of Fish	Total wt. of fish approx.	Average wt. of each fish approx.	Wt. of Islets	Wt. of Islets per 1000 lb. of fish	Yield in units: Total	Yield in units: 1000 lb. of fish	No. of lbs. of fish per unit	No. of units per gram of Islets	Cost of manufacture
Cod		lbs.	lbs.	grams						
N.A.M.	40	650	16	4.4	6.8	100	153	6.5	22.7	0.16c.
N.A.M.	300	1500	5	8.46	5.64	96	63	15.5	11.3	1.25c.
Robicheau (boy)	300	2100	7	3.76	1.8	48	23	43.7	12.7	2.50c.
Robicheau (boy)	900	6000	7	33.93	5.66	462	77	13.0	13.6	0.78c.
Morse	2400	26936	11.2	66.67	2.47	1350	50	20.0	20.2	0.71c.
Morse	1250	9000	7.2	42.67	4.74	250	28	36.0	5.8	2.00c.
N.A.M. & E.C.N.	1800	22000	12	164.25	7.46	2400	109	9.2	14.7	0.37c.
Sugden	300	4500 to 6000	15 to 20	31.0	7.0 to 5.2	pic. H to 600	100 to 135	7.5 to 10.0	19.3	0.30c.
Sugden	385	5775 to 7700	15 to 20	49.5	6.4 to 8.6	pic. H to 840	110 to 147	6.8 to 9.2	17.0	0.27c.

6.193

From these two trials it is suggested that the fermentation product may contain factors essential to the early growth of the poult which are not furnished by fish meal or fish meal and dried whey in combination. The data further indicate a persistent response to the fermentation product throughout the entire growth period.

Economic analysis of the data from the second experiment demonstrated greater returns from the less expensive meat scrap diet supplemented with a fermentation product as compared with the ration containing fish meal or the one containing several conventional sources of UGF.

The third experiment was made to determine the influence of the Calorie to protein ratio on response to UGF. There was no apparent response to additional UGF at low Calorie to protein ratios. Because of the high feed consumption per unit of gain on the low energy diet, the birds probably satisfied their UGF requirements from the low level of these factors in the basal. UGF supplementation was most beneficial with medium Calorie to protein ratios. The best 24 week weights during weeks 1 to 8, 9 to 16, and 17 to 24 resulted from ratios of 30 to 34, 45 to 50, and 60 to 65, respectively.

8.42

THE INORGANIC COMPOSITION OF BROWN TROUT BLOOD AND A COMPARISON OF IT WITH THE BLOOD OF CARP AND HUMAN BEINGS

Constituent	Milligrams per 100 cubic centimeters: Brown trout Average	Brown trout Range	Carp[1] Average	Carp[1] Range	Human beings[2] Range
Blood serum					
Iron	0.25	0.25 - 0.25	0.025	0.016 - 0.033	
Chloride	424	419 - 438	401	347 - 446	450 - 500
Sodium	358	348 - 373	300	292 - 316	330
Magnesium	2.3	2.1 - 2.5	3.3	2.5 - 3.9	1 - 3
Potassium	20.1	16.9 - 25.8	24.6	17.5 - 26.9	16 - 22
Calcium	12.5	11.6 - 13.6	11.5	9.5 - 14.8	9 - 11.5
Phosphorus, inorganic	9.3	8.6 - 9.9	8.69	6.79 - 12.10	3 - 4
Phosphorus, total	21.1	20.2 - 21.6	49	37.3 - 60.6	
Sulfate, inorganic	0.8	0.7 - 0.9	0.944	0.765 - 1.172	0.9 - 1.1
Whole blood					
Iron	29.4	28 - 31			52
Copper	0.28	0.26 - 0.30	0.10	0.08 - 0.109	0.5 - 0.25

[1] All values except copper taken from Field, Elvehjem, and Juday (1943); copper values from Sarata (1938).

[2] Values from Hawk and Bergeim (1937).

6.193 A COMPARISON OF UNIDENTIFIED GROWTH FACTOR SOURCES FOR TURKEYS AND INFLUENCE OF CALORIE-PROTEIN RATIO ON RESPONSE

Donovan, G. A., Warden, W. K., and Reynolds, W. M. (Terre Haute, Indiana)
Poultry Science 37, 422-428 (March 1958)

In the first experiment, supplementation of a vegetable protein ration, complete in all known nutrients, with 0.15 percent or 0.30 percent of a fermentation product supplying unidentified growth factors (UGF) increased early poult growth by 7.0 percent and 7.3 percent, respectively. Ten percent fish meal plus 3 percent dried whey included on an iso-protein, -calcium, -phosphorus basis, increased growth by 2.4 percent. The growth response obtained from a combination of the fermentation product and fish and whey was no greater than that obtained from the fermentation product alone.

Inclusion of six natural sources of UGF (fish meal, fish solubles, dried whey, dried corn distillers solubles, dried brewers yeast and meat scrap) enhanced growth by 2.4 percent. When 0.3 percent of the fermentation product also was included with the other six sources, growth was improved by 6.1 percent above the ration containing no special UGF source.

In the second experiment the birds were carried to market age. The basal, formulated to be as economical as possible, contained 3 percent meat scrap, a moderate source of UGF. Supplementation with 0.15 percent of the fermentation product brought about consistent increases in growth of 2.8 percent, 1.6 percent, and 2.5 percent at 8, 16, and 24 weeks of age, respectively. The 24-week increase was the only one that was statistically significant. The use of 2 percent fish meal had no effect upon growth rate at 8 and 16 weeks, but at 24 weeks there was a slight improvement (0.06 percent). Supplementing the basal with 10 percent wheat middlings, 5 percent fish meal and 3 percent dried whey gave no additional growth promoting effect.

(over)

Authors' summary

8.42 THE INORGANIC COMPOSITION OF BROWN TROUT BLOOD

Phillips, Arthur M., Jr. and Brockway, Donald R. (Bureau of Sport Fisheries and Wildlife and New York Conservation Department, Cortland, New York)
The Progressive Fish-Culturist 20, 58-61 (April 1958)

The chemical composition of the blood of many species of higher animals is well known. This information has been invaluable in basic studies of animal physiology, in diagnosing pathological conditions, in establishing normal metabolism of the food of the animals, and in studying and culturing disease organisms afflicting higher animals. Studies of the chemical composition of fish blood in general are fragmentary and almost nonexistent for trout blood.

Samples of blood were withdrawn from 2-year-old brown trout. Brown trout of this age were large enough to assure adequate blood samples but were too young to spawn during the year. Avoidance of spawning was considered important because it was desired to preclude abnormal blood composition caused by sexual activity. The trout averaged approximately 300 grams in weight. To assure standard conditions at the time of sampling for blood, the fish were fed at 4 p.m. the day before their experimental use and the samples of blood were taken the next day at 7 a.m. before the fish were fed. This practice made it possible to avoid the changes in blood chemistry that might have occurred if digestion and absorption of food had been at a peak when the blood was sampled. For a complete series of analyses, relatively large samples of blood were required and it was necessary to pool the blood from individual fish until a total volume of 25 cubic centimeters of blood was obtained. The pooled blood sample was allowed to clot, and the serum was recovered.

The serum was analyzed for iron, chloride, sodium, magnesium, potassium, calcium, phosphorus, and sulfate. In addition to the serum analyses, copper and iron were determined on whole brown trout blood.

The results are summarized in the table.

See table, over.

(over)

ABSTRACTER: Kathryn L. Osterhaug

7.86 BASIC PRINCIPLES AND INSTRUMENTATION. CHAPTER V. KINESTHETICS--TEXTURE

Kramer, Amihud and Twigg, Bernard A. (University of Maryland)
Canner and Freezer 126, 14-17, 39 (April 14, 1958)

Textural or kinesthetic characteristics deal with the sense of feel. The problem therefore is to find physical instruments or chemical procedures that will simulate and measure the sensations the consumer experiences through his sense of feel, with his fingers, and more particularly with his mouth.

Some of these sensory characteristics are listed as follows:

1. Finger feel.--(a) Firmness, as encountered by the consumer selecting a firm apple, measured physically by compression. (b) Softness, or yielding quality, as in selecting a peach or plum, measured physically by compression. (c) Juiciness, as in immature sweet corn where the thumbnail is used to test the ease and amount of juice squeezed out of a kernel, measured physically by puncturing, or juice extraction.

2. Mouth feel.--(a) Chewiness, as sensed by the resistance of the product to compression and shearing action of the teeth. (b) Fibrousness, as sensed by the presence of an inedible residue remaining in the mouth after mastication as well as by resistance to cutting force of the teeth. (c) Grittiness, as sensed by the presence of small grit particles, such as sand, or stone cells. (d) Mealiness, as sensed by the coating of starch or other material with adhesive properties over mouth tissues. (e) Stickiness, as sensed by the mouth while chewing foods with adhesive properties.

In general, these factors lend themselves readily to objective measurements by the use of mechanical instruments. Thus, a considerable array of tenderometers, texturemeters, puncturemeters,

(over)

ABSTRACTER: Kathryn L. Osterhaug

8.51 THE YIELD OF INSULIN FROM FISH

McCormick, N. A. and Noble, E. C. (Marine Biological Laboratory, St. Andrews, New Brunswick, and the University of Toronto, Canada)
Contributions to Canadian Biology 2, No. 7, 117-127 (1924)

MacLeod has demonstrated that insulin is present in the pancreas of certain Elasmobranchii (Squalus and Raja) and in the principal islets of certain Teleostei (Myoxocephalus and Lophius), and that it can be extracted from these tissues by comparatively inexpensive methods. Clinical trials have shown it to be entirely satisfactory for use in man.

In the present investigation, the observations have been extended over a wider range of fishes.

The procedure was to test in the usual manner, on normal rabbits, extracts prepared from the islets, or pancreas, of the following species: (1) flounder (Pseudopleuronectes americanus), (2) sea raven (Hemitripterus americanus), (3) eel pout (Zoarces anguillaris), (4) shark (Prionace glauco and Somniosus microcephalus), (5) lump fish (Cyclopterus lumpus), (6) haddock (Melanogrammus aeglefinus), (7) hake (Merluccius bilinearis), (8) cod (Gadus callarias), (9) pollock (Pollachius virens), and (10) halibut (Hippoglossus hippoglossus). The extracts prepared from certain of these fish were subjected to further purification and then were tested clinically.

Data on the cod with conditions of collection omitted are given in the accompanying table.

See table, over.

(over)

ABSTRACTER: F. Bruce Sanford

UNIDENTIFIED GROWTH FACTOR RESOURCES FOR TURKEYS

MEASURING TEXTURE

COMPOSITION OF TROUT BLOOD

INSULIN FROM FISH

7.86

succulometers, fibrometers, and pressure testers are available.

Many of the sensations have in common the principle of resistance to force, so that in general, the unit of measurement may be in terms of pounds force. This force may be applied in a number of ways or through a combination of two or more of these methods including: (1) compression, (2) shearing, (3) cutting, (4) tensile strength, and (5) shear-pressure.

The relations of these consumer sensations (sensory) to the physical methods of application of force (physical) are summarized in table 1, together with some of the instruments and procedures that have been suggested as methods of measuring these characteristics.

Table 1.--Relation of kinesthetic characteristics to physical methods of application of force.

Sensory	Physical	Instruments or procedures
Firmness	compression	pressure tester, shear-press
Yielding quality	compression	pressure tester, shear-press
Juiciness	compression (juice extraction)	puncture tester, succulometer, shear-press, moisture tests
Chewiness	shear-pressure	tenderometers, texturemeter, shear-press, A.I.S., specific gravity tests
Fibrousness	cutting, comminuting	fibrometer, shear-press, fiber analysis
Grittiness	- - -	comminution, elution, sedimentation tests
Mealiness	- - -	starch, gum analysis
Stickiness	tensile strength	jelly strength tester, pectin gum analysis

8.51 (Cross Reference: 6.72)

Fish and Collector	No. of Fish	Total wt. of fish approx.	Average wt. of each fish approx.	Wt. of Islets	Wt. of Islets per 1000 lb. of fish	Yield in units		No. of lbs. of fish per unit	No. of units per gram of Islets	Cost of manufacture
						Total	1000 lb. of fish			
Cod		lbs.	lbs.	grams						
N.A.M.	40	650	16	4.4	6.8	100	153	6.5	22.7	0.16c.
N.A.M.	300	1500	5	8.46	5.64	96	63	15.5	11.3	1.25c.
Robicheau (boy)	300	2100	7	3.76	1.8	48	23	43.7	12.7	2.50c.
Robicheau (boy)	900	6000	7	33.93	5.66	462	77	13.0	13.6	0.78c.
Morse	2400	26936	11.2	66.67	2.47	1350	50	20.0	20.2	0.71c.
Morse	1250	9000	7.2	42.67	4.74	250	28	36.0	5.8	2.00c.
N.A.M. & E.C.N.	1800	22000	12	164.25	7.46	2400	109	9.2	14.7	0.37c.
Sugden	300	4500 to 6000	15 to 20	31.0	7.0 to 5.2	pic. H 600	100 to 135	7.5 to 10.0	19.3	0.30c.
Sugden	385	5775 to 7700	15 to 20	49.5	6.4 to 8.6	pic. H 840	110 to 147	6.8 to 9.2	17.0	0.27c.

6.193

From these two trials it is suggested that the fermentation product may contain factors essential to the early growth of the poult which are not furnished by fish meal or fish meal and dried whey in combination. The data further indicate a persistent response to the fermentation product throughout the entire growth period.

Economic analysis of the data from the second experiment demonstrated greater returns from the less expensive meat scrap diet supplemented with a fermentation product as compared with the ration containing fish meal or the one containing several conventional sources of UGF.

The third experiment was made to determine the influence of the Calorie to protein ratio on response to UGF. There was no apparent response to additional UGF at low Calorie to protein ratios. Because of the high feed consumption per unit of gain on the low energy diet, the birds probably satisfied their UGF requirements from the low level of these factors in the basal. UGF supplementation was most beneficial with medium Calorie to protein ratios. The best 24 week weights during weeks 1 to 8, 9 to 16, and 17 to 24 resulted from ratios of 30 to 34, 45 to 50, and 60 to 65, respectively.

8.42

THE INORGANIC COMPOSITION OF BROWN TROUT BLOOD AND A COMPARISON OF IT WITH THE BLOOD OF CARP AND HUMAN BEINGS

Constituent	Milligrams per 100 cubic centimeters							
	Brown trout			Carp[1]			Human beings[2]	
	Average	Range		Average	Range		Range	
	Blood serum							
Iron	0.25	0.25	- 0.25	0.025	0.016	- 0.033		
Chloride	424	419	- 438	401	347	- 446	450	- 500
Sodium	358	348	- 373	300	292	- 316	330	
Magnesium	2.3	2.1	- 2.5	3.3	2.5	- 3.9	1	- 3
Potassium	20.1	16.9	- 25.8	24.6	17.5	- 26.9	16	- 22
Calcium	12.5	11.6	- 13.6	11.5	9.5	- 14.8	9	- 11.5
Phosphorus, inorganic	9.3	8.6	- 9.9	8.69	6.79	- 12.10	3	- 4
total	21.1	20.2	- 21.6	49	37.3	- 60.6		
Sulfate, inorganic	0.8	0.7	- 0.9	0.944	0.765	- 1.172	0.9	- 1.1
	Whole blood							
Iron	29.4	28	- 31				52	
Copper	0.28	0.26	- 0.30	0.10	0.08	- 0.109	0.5	- 0.25

1/ All values except copper taken from Field, Elvehjem, and Juday (1943); copper values from Sarata (1938).

2/ Values from Hawk and Bergeim (1937).

7.53 FAT DETERMINATION

Collett, A. B.
Norsk Hvalfangst-Tidende 45, No. 9, p. 511 (Sept. 1956)
World Fisheries Abstracts 9, 43-44 (March-April 1958)

The fat content of extract from whale meat, regularly manufactured by several whaling companies, is one of the most important quality factors and should be as low as possible. The lack of sufficiently quick and reliable methods for such determinations of small fat quantities, usually in the area of 0.01 to 0.1% of the solid, has been strongly felt by the producers, and a method to overcome this difficulty is suggested. On board floating vessels, it may be sufficiently exact to use a volumetric method by determining the quantity of NaOH required to saponify the fat quantity in question. In this case, it is important to remove all traces of acid beforehand.

A hundred g. of meat extract (70 to 80% dry matters) are weighed in a beaker, 20 ml. concentrated HCl are added under stirring with a glass rod and the mixture is heated for about 15 min. on a steam bath. After cooling, 50 to 60 ml. water and 80 to 90 ml. ethyl alcohol are added and the whole solution transferred to a separating funnel. Thereafter, 50 ml. ethyl ether and 50 ml. hexane (b. p. 40° to 60° C.) are added, and the funnel is vigorously shaken for about 1 min. After separation has taken place, another extraction with the same quantity of ethyl ether and hexane is carried out. The combined ether-hexane extracts are washed 5 to 6 times with about 10 ml. water each time. In case there should be a small tendency for a formation of emulsions, small additions of alcohol usually help. The ethyl ether-hexane is removed by evaporation, towards the end under vacuum in a round bottom flask. If necessary, the last traces of water are removed in a drying cabinet. In cases where it is impossible to carry out weighing operations a certain volume of 0.1 N alcoholic KOH is added by means of a pipette. The number of ml. should be at least 100 times the expected gram quantity of fat.

(over)

Reprinted in part

8.9 STUDIES ON THE NORTH SEA COD I. MUSCLE CELL DIMENSIONS

Love, R. M. (Torry Research Station, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 9, 195-198 (April 1958)

Purpose.--Cod muscle was studied to learn the extent of variation in the size and in the number of muscle fibers per unit volume. Knowledge of this variation in muscle fibers is believed to be of importance for obtaining rational and constant samples of flesh for use in assays for certain chemical constituents.

Materials and methods.--Cod (Gadus callarias) used in these studies were obtained in the North Sea about 30 miles off the Aberdeen coast. To prepare a suspension of intact muscle fibers, not more than 0.5 grams of muscle was chopped into several pieces with a scissors and transferred to the metal cup of a homogenizer that is agitated by means of a top-drive, flat metal paddle in place of the customary knife-edged blades. About 20 milliliters of 3.5 percent formaldehyde was added, and the homogenizer was operated for 10 seconds at 1130 r. p. m.; then for 5 seconds at 2100 r. p. m. or, respectively, at half and at full speed. This resulted in a stable suspension of muscle fibers completely separated from each other and essentially unbroken. A microscope fitted with a micrometer eyepiece and a 16-millimeter objective was used to measure the width of the fibers. Intact fibers that showed two sharp, parallel margins were measured, whereas split fibers that showed undulations of one of the margins as a result of damage in the process of being homogenized were not measured. Muscle fiber measurements were verified by the following alternative procedure: Cubes with sides about 5 ml. in length were cut from similar samples of the muscle and frozen in liquid oxygen, vacuum-dried at -30° C., vacuum-embedded in paraffin wax, and cross-sectioned at 12.5 μ, essentially as described by Koonz and Ramsbottom (1939). Images of the stained sections were projected onto sheets of graph paper in a dimly lighted room by means of a mirror attachment

(over)

ABSTRACTER: Martin Heerdt

8.7 FEDERAL SPECIFICATIONS FOR FISHERY FOOD PRODUCTS AND THE RESPONSIBILITY OF THE U. S. BUREAU OF COMMERCIAL FISHERIES

Piskur, Frank T. and Sereno, Mario N. (Fishery Technological Laboratory, East Boston, Massachusetts)
Commercial Fisheries Review 20, 1-6 (February 1958)

Federal specifications serve both industry and government in the following ways: (1) Standardize the items used by the Federal Government. (2) Reduce the number of sizes, kinds, and types of items. (3) Standardize packing, packaging, and method of preservation. (4) Provide a means by which buyer and seller can reach an agreement. (5) Become legal documents when used as a basis for contracts. (6) Enable bidders to compete on an equal basis.

Bureau of Commercial Fisheries responsibility for the development of Federal Specifications and the necessary research work is delegated to the Fishery Technological Laboratory in East Boston, Massachusetts. This work is done in cooperation with the Quartermaster Food and Container Institute for the Armed Forces, Chicago, Illinois, the latter being responsible for the packing and packaging sections. The Bureau determines the fish products needs of Federal agencies and prepares specifications in cooperation with the fishery industry and other Federal agencies involved.

What is a Federal specification?--A Federal specification is a clear, accurate description of the technical requirements for a material, a product, or a service, including the procedure to determine that the requirements have been met.

Types of specifications for food products.--Food-product specifications are of three types:

(over)

ABSTRACTER: Max Patashnik

9.13 THE BODY TEMPERATURE OF FISHES

Britton, S. W. (McGill University, Montreal, Canada)
Contribution to Canadian Biology (New Series) 1, No. 19-25, 413-418 (1924)

Simpson has pointed out that only small differences are found between the body temperature of several types of marine fish and the temperature of the water in which they live. He found an excess of body temperature of fish over temperature of surrounding water of from 0.1° to 0.7° C.

The author's work was on the body temperature of fish caught off the North American shore, since these fish differ from those described by Simpson.

The fish observed by the author were caught in salt water at the mouth of the St. Croix River. Water temperatures were recorded by a Negretti and Zambra patent deep-sea reversing thermometer.

The surface temperature of the water was usually 1° to 4° higher than the deep-sea temperature, and the air temperature was usually a few degrees above that of the surface water. Notwithstanding these circumstances, any acquisition of heat by the interior of the fish was insignificant during the short time intervening between the withdrawal of the fish from the deep water and the taking of its body temperature.

A fish, on being withdrawn from the water, was immediately grasped by the snout and gill covers, and a rectal thermometer was introduced to a depth of 6 to 8 centimeters. Only the largest specimens were examined. These specimens generally ranged from 3 to 10 pounds in weight. The temperature differences shown by the fish taken from deep water are given in the accompanying table.

With Myoxocephalus greenlandicus taken in 2 fathoms, where the temperature of the water was 13.3°, the temperature of the fish was 13.7°. When the same species was tested in a laboratory tank held at 15.5°, the temperature of the fish was 15.6°.

Since these observations agreed with those of Simpson, the author concluded that most fish show a body temperature slightly in excess of the temperature of the water in which they live. This temperature difference appears to be, within limits, inversely proportional to the water temperature.

(over)

ABSTRACTER: F. Bruce Sanford

8.7

(1) Federal, (2) Interim Federal, and (3) Departmental.

Specifications format.--Product specifications contain six numbered sections as follows: Section 1, Scope and classification, section 2, Applicable specifications and publications; section 3, Requirements, section 4, Sampling, inspection and test procedures; section 5, Preparation for delivery; and section 6, Notes.

Basic requirements in the development of a specification.--The following requirements are observed in the development of a specification: (1) The needs of all government agencies having an interest in the items must be considered. (2) The number, types, grades, and varieties shall be held to a minimum consistent with the economy of the operation. (3) Wherever practical, functional or performance requirements rather than compositional requirements shall be specified. (4) Nationally recognized industry commercial specifications and standards shall be used and adopted to the maximum extent practicable. (5) Specification requirements that can be met by products of standard, commercial production shall be used to the maximum extent consistent with Government requirements. (6) The preservation, packaging, packing, and marking requirements shall be uniform to the greatest extent possible consistent with the varying needs of Federal agencies and shall be adequate to assure delivery and storage of products in a satisfactory condition, with the greatest practicable conservation of manpower, materials, and money. (7) Federal specifications shall be consistent with the regulatory specifications and standards of other Federal agencies. (8) Federal specifications shall be consistent to the maximum degree possible with the permissive specifications and standards of other regulatory Federal agencies. (9) Specifications should consider conservation of critical materials.

Development of Federal specifications.--The responsibility for development of Federal specifications is assigned by the General Service Administration to other Federal agencies--with their consent. This assignment also includes responsibility for coordination with Federal agencies and industry, and for amendment, revision, and further development as needed.

9.13

Date, Water depth	Name of fish	No. Examined	Temp. of fish	Temp. of water	Temp. difference
June 28, 1922, 17 fathoms	Raja ocellata	4	8.6	7.9	0.7
	Aeglefinus melanogrammus	7	8.65	7.9	0.75
	Gadus morrhua	2	8.75	7.9	0.85
July 12, 1922, 17 fathoms	Raja ocellata	4	9.4	8.7	0.7
	Aeglefinus melanogrammus	8	9.3	8.7	0.6
	Gadus morrhua	6	9.4	8.7	0.7
	Zoarces anguillaris	2	9.55	8.7	0.85
	Hemitripterus americanus	1	9.4	8.7	0.7
July 19, 1922, 10 fathoms	Raja ocellata	3	10.0	9.4	0.6
	Aeglefinus melanogrammus	7	9.9	9.4	0.5
	Hemitripterus americanus	2	10.1	9.4	0.7
July 28, 1922, 17 fathoms	Raja ocellata	27	10.25	9.6	0.65
	Raja erinacea				
	Aeglefinus melanogrammus	6	10.25	9.6	0.65
	Zoarces anguillaris	1	10.4	9.6	0.8
Aug. 1, 1922, 17 fathoms	Raja ocellata	1	10.4	9.7	0.7
	Aeglefinus melanogrammus	4	10.45	9.7	0.75
	Gadus morrhua	1	10.4	9.7	0.7
	Zoarces anguillaris	1	10.6	9.7	0.9
Aug. 9, 1922, 17 fathoms	Raja ocellata	8	10.55	10.0	0.55
	Aeglefinus melanogrammus	4	10.6	10.0	0.6
	Gadus morrhua	2	10.7	10.0	0.7
	Zoarces anguillaris	1	10.7	10.0	0.7

7.53

For standard quality meat extract containing less than 0.1% fat a volume of 10 ml. will be suitable. To the round bottom flask is further added 10 to 20 ml. ethyl alcohol (neutralized against phenolphthalein). A small glass funnel is placed in the neck of the flask, and it is heated on a steam bath for 5 to 10 min. Thereafter, the flask is cooled down and the content is titrated by 0.1 N HCl against phenolphthalein. A blank test is carried out with the same quantity of ingredients, but without fat. Whale meat oil will normally have a saponification number corresponding to 34 to 40 ml. N KOH/g. If we chose 37 as an average, the fat percentage of the meat extract will follow from the following equation:

$$\% \text{ fat} = \frac{b-a}{37} \text{ where}$$

a = ml. 0.1 N HCl to neutralize sample and
b = ml. 0.1 N HCl blank.

The method has been tried on meat extracts with fat content ranging from 0.01 to 0.5%. Examples are given in a table showing results obtained by weighing and by titration. The conformity is satisfactory for process control purposes. The method has been controlled by adding known quantities of fat to meat extract. In 2 ethyl ether-hexane extracts, the yield of fat will usually be at least 95%. Further extracts may be needed when the fat content is exceptionally high (1% and more). An analysis according to this method can be carried out in the course of 1½ hrs. The method was used aboard a floating factory in the Antarctic during the whaling season 1955/56.

8.9

on the eyepiece of the microscope. Outlines of the fibers were then traced with a pencil, and the cross-section areas were tabulated by counting the printed squares.

Results.--Cod fillets are made up of about 50 segments or myotomes that are divided by sheets of connective tissue or myocommata. Fiber lengths correspond to the distances between myocommata. This distance varies in a characteristic way over the entire length of the fish. Fiber lengths in fillets are shortest at the tail, increase in length anteriorly until a maximum length is reached about 12 myotomes from the point of severance of the fillet from the head, and then decrease in length.

Measurement of the width of fibers obtained from the various myotomes showed a striking resemblance to the pattern of the length of the fibers. Examination of the histological section showed that the number of fibers present in a volume of muscle was inversely related to the size of these fibers.

The length of the longest fibers (width of the largest myotomes) was directly proportional to the length of the intact fish. With this information the length of the fish from which a fillet was obtained can be predicted with fair accuracy. This linear relationship also applied to the width of the fibers, which was directly proportional to the length of the intact fish.

Conclusions.--Care should be used to select suitable tissue from fish fillets when a chemical analysis is planned. The authors suggest dissecting out muscle from one myotome group or an adjacent group of myotomes from fish of the same size for all determinations of one or more chemical constituents.

0.32 ISOLATION AND PROPERTIES OF A LOW MOLECULAR WEIGHT PROTEIN OF CARP MYOGEN

Hamoir, G. (Laboratoire de Biologie generale, Universite de Liege, Belgium)
The Biochemical Journal 66, 29p. (June 1957)

0.32 ON FISH TROPOMYOSIN I. ISOLATION AND AMINO ACID COMPOSITION

Kubo, Shuichiro (Hokkaido University, Hakodate, Japan)
Bulletin of the Faculty of Fisheries, Hokkaido University 8, No. 2, 147-157 (August 1957) (In English)

In this study, tropomyosin, which can be obtained in high degree of purity from muscle fibrils, is crystallized from haddock muscle by Bailey's method; and its amino acid composition is reported. Haddock tropomyosin was crystallized in high purity. The electrophoretic mobility of fish tropomyosin is more close to that of mammalian tropomyosin than to that of invertebrate tropomyosin. Similarity also was recognized in the amino acid composition.

0.32 ON FISH TROPOMYOSIN II. TERMINAL RESIDUE IN TROPOMYOSINS

Kubo, Shuichiro (Hokkaido University, Hakodate, Japan)
Bulletin of the Faculty of Fisheries, Hokkaido University 8, No. 3, 214-219 (November 1957) (In English)

Fish tropomyosin has one isoleucine for the C-terminal residue and no N-terminal residue. This is the same as rabbit, bullfrog, and squid tropomyosin.

0.38 STUDIES ON CRYSTALLINE WHALE PEPSIN

Saito, Tsuneyuki; Ishihara, Yoshio; Iio, Yasuzo; and Sasaki, Teiichi (Hokkaido University, Hakodate, Japan)
Bulletin of the Faculty of Fisheries, Hokkaido University 8, 220-223 (November 1957) (English synopsis, table, and figures)

III. Analysis of amino acid by paper chromatography. -- In comparison with swine pepsin, acid-hydrolysates of whale pepsin contained larger amounts of the basic amino acids arginine, lysine, and histidine; whereas alkali-hydrolysates of whale pepsin contained larger amounts of the S-containing amino acids. Acid- and alkali-hydrolysates of whale pepsin contained cystine, aspartic acid, glutamic acid, glycine, serine, threonine, lysine, histidine, arginine, alanine, tyrosine, α-aminobutyric acid, proline, valine, methionine, tryptophane, phenylalanine, and leucines.

IV. Free amino acids in peptic digests of various proteins. --Ibid. 224-232. Casein, edestin, egg-white, zein, whale insulin, and gamma globulin were hydrolyzed with whale pepsin and with swine pepsin. The kinds and amounts of free amino acids liberated were determined by paper chromatography. A larger number of amino acids were liberated by both whale pepsin and swine pepsin. With whale pepsin, the liberation of amino acids at pH 3.0 was greater both qualitatively and quantitatively than the liberation of amino acids at pH 1.8. Whale pepsin effects a different type of proteolysis than does swine pepsin.

V. Relation between denaturation and activity. --Ibid. 233-237. Storage of whale pepsin in 5.0 M urea at 40° C. for 10 hours reduced proteolytic activity to 40 percent of its initial value; whereas storage of whale pepsin in 8.0 M urea for 5 hours or storage of whale pepsin in 3.0 M guanidine for 20 hours caused complete inactivity. Whale pepsin was only 30 to 50 percent as effective in its proteolytic activity on denatured proteins such as urea-denatured hemoglobin or heat-coagulated fish flesh as it was in its proteolytic activity on raw proteins.

2.01 THE NONENZYMIC REDUCTION OF TRIMETHYLAMINE OXIDE TO TRIMETHYLAMINE, DIMETHYLAMINE, AND FORMALDEHYDE

Vaisey, E. B.
Canad. J. Biochem. Physio. 34, 1085-1090 (1956)
Food Science Abstracts 29, 216 (June 1957)

Trimethylamine oxide is readily reduced by cysteine at 22° to 24° C., in the presence of iron or haemoglobin as catalyst. The main product of the reaction is trimethylamine, but appreciable amounts of dimethylamine and formaldehyde are also formed. The maximum reduction of the oxide occurs between pH 7 and 8. Larger amounts of ferrous iron reduced trimethylamine oxide without the presence of cysteine, giving the same products.

2.03 THE BLACK DISCOLORATION OF LOBSTER

Kakimoto, Daiichi and Kanazawa, Akio (Kagoshima Univ.)
Nippon Suisan Gakkaishi 22, 471-475 (1956-57)
Chemical Abstracts 52, 7563 (May 10, 1958)

I. The origin of the discoloration. -- Black discoloration of Panulirus japonicus that often occurs during storage was more distinct in the viscera than in the muscle when stored 24 hrs. in water at 37°. The HCl-sol. pigment was suggested to be a precursor or intermediate in melanin formation.

II. The tyrosinase distribution and its relation with black discoloration. --Ibid. 476-479. H_2S, $HgCl_2$, aniline, and ascorbic acid inhibited the discoloration in the systems of liver + blood and tyrosine + blood.

2.1125 STUDY ON THE FISHING CAPACITIES OF PURSE SEINES--II.

Iitaka, Yunosuke (University of Kyoto, Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 23, No. 1, 24-26 (1957) (In English)

II. On the difference between single and double purse seines operating in Wakasa Bay. -- The catching capacities of the two purse seiners, a single and a double purse seiner, operating in Wakasa Bay were compared based on the data of daily catches of each species of fish by means of the statistical analysis of variance.

2.1125 STUDY ON THE EFFECTS OF THE FISH-GATHERING BY MEANS OF FURINAWA

Imamura, Yutaka and Ogura, Michio
Bulletin of the Japanese Society of Scientific Fisheries 23, No. 3, 150-156 (1957) (English synopsis and figures)

In the inland sea of Japan it has been the practice to catch Pagrosomus major (T. & S.) with a Sibariami type of purse seine.

2.8 INFRARED PROCESSING IS REALLY CATCHING ON

Anonymous
Food Engineering 30, 110-114 (February 1958)

(Abstract of this article appears under 3.237 page 7 - July 1958)

2.8 THE GENTLE SOLE

Anonymous
Gourmet 18, 16-17, 34, 36-38 (May 1958)

2.9 THIAMINASE FROM FISH I. PROPERTIES OF THIAMINASE

Deolalkar, S. T. and Sohonie, Kamala (Inst. Sci., Bombay)
Indian J. Med. Research 45, 571-86 (1957)
Chemical Abstracts 52, 7380 (May 10, 1958)

2.9 THIAMINASE FROM FISH II. THE EFFECT OF CERTAIN COMPOUNDS ON THIAMINASE ACTIVITY

Deolalkar, S. T. and Sohonie, Kamala (Inst. Sci., Bombay)
Indian J. Med. Research 45, 587-92 (1957)
Chemical Abstracts 52, 7381 (May 10, 1958)

3.5 THE WORLD I LIVED IN

Mrak, Emil M. (University of California, Davis)
Food Technology 11, 541-552 (November 1957)

Salt-tolerant yeasts of common species of Debaryomyces usually grow as films on pickle, ham, vegetable and other brines. They also grow in salted meats and fish and on shrimp from the Gulf of Mexico. Some of these yeasts grew in a medium containing 16 percent salt, whereas others were less tolerant to salt.

3.5 REMOVAL OF SALT FROM SALTED WHALE MEAT

Ando, Kazuo
Suisangaku Kaishi 22, 195-7 (1956-57)
Chemical Abstracts 52, 5690 (April 10, 1958)

Salted whale meat was soaked in running water at the outflow velocity of 570 cc. per minute at various temperatures to test desalting. The moisture content of the meat increased at 25° and 35°, but it decreased, with an initial temporary increase, at 45° and 55°.

4.13 FISH LIPIDES. THE ACID LIPIDES PRESENT IN AN ACETONE MUSCLE EXTRACT OF GADUS AEGLEFINUS

Brenner, Rodolfo R.
Anales asoc. quim. arg. 44, 210-25 (1956)
Chemical Abstracts 52, 589 (January 10, 1958)

4.13 THE LIPIDES OF THE FLESH OF THE COD (GADUS MORRHUA)

Pineda, Maria Dolores Garcia
Inst. espan. oceanog., Trabajos No. 23, 46 pp. (1957)
Chemical Abstracts 52, 5682 (April 10, 1958)

The flesh of the codfish contains 0.8 percent lipides, of which 0.2 percent are free and the remainder are linked to proteins.

CONVERSION UNITS

1 pound = 453.59 grams
1 ounce = 28.350 grams
1 inch = 2.5400 centimeters
1 gallon = 128 ounces
1 gallon = 231 cubic inches
1 quart = 0.9463 liters
1 ounce = 29.573 milliliters

CONVERSION OF TEMPERATURE SCALES

$F = 9/5\ C + 32$

$C = 5/9\ (F-32)$

SPECIFIC HEAT AND HEAT OF FUSION

Average values of specific heat generally used for fishery products are 0.80 B.t.u. per pound per °F. above freezing and 0.40 B.t.u. per pound per °F. below freezing.

An average heat of fusion generally used for fishery products is 115 B.t.u. per pound. The heat of fusion of ice is 144 B.t.u. per pound.

DEFINITIONS

calorie ..... heat required to raise the temperature of 1 gram of water 1 degree Centigrade

British thermal unit .....252 calories or the heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit

ton of refrigeration ..... removal of heat at the rate of 12,000 B.t.u. per hour

atmospheric pressure, normal ..... a pressure at sea level of 14.696 pounds per square inch, absolute

sensible heat ..... heat added to the body when its temperature is changed

latent heat ..... heat absorbed or evolved during a change of state, with no change of temperature

heat of fusion ..... heat absorbed when a solid melts, with no change of temperature

heat of vaporization ..... heat absorbed when a liquid vaporizes, with no change of temperature

heat of reaction ....., heat evolved or absorbed during a chemical reaction

heat transmission .....flow of heat by conduction, convection, or radiation, singly or in any combination

horsepower ..... work performed at the rate of 550 foot pounds per second

mechanical equivalent of 1 B.t.u. of heat ..... heat given off by a total expenditure of 778 foot pounds of energy

COMMON ABBREVIATIONS*

A.	Ångstrom unit(s)
a.c.	alternating current
alc.	alcohol, alcoholic
alk.	alkaline (not alkali)
amp.	ampere(s)
anhyd.	anhydrous
aq.	aqueous
at.	atomic (not atom)
at. wt.	atomic weight
Bé.	Baumé
biol.	biological
B.O.D.	biochemical oxygen demand
b.p.	boiling point
B.t.u.	British thermal unit(s)
cal.	calorie(s)
cc.	cubic centimeter(s)
cm.	centimeter(s)
d.	density (d_{13} specific gravity at 13° referred to water at 4°; d_{20}^{20}, at 20° referred to water at the same temperature)
d.c.	direct current
e.m.f.	electromotive force
Et	ethyl (Et_2O, ethyl ether)
e.v.	electron volt(s)
f.p.	freezing point
ft.	foot, feet
g.	gram(s)
γ	microgram(s)
hr.	hour
in.	inch(es)
kcal.	kilocalorie(s)
kg.	kilogram(s)
kv.	kilovolt(s)
kv.-amp.	kilovolt-ampere(s)
kw.	kilowatt(s)
kw.-hr.	kilowatt-hour
l.	liter(s)
lb.	pound(s)
m.	meter(s); also (followed by a figure denoting temperature) melts at, melting at
M.	molar (as applied to concn.)
ma.	milliampere(s)
Mc.	megacycle
mc.	millicurie
Me	methyl (MeOH, methanol)
meq.	milliequivalent
m.e.v.	million electron volts
mg.	milligram(s)
ml.	milliliter(s)
mm.	millimeter(s)
mγ	millimicrogram
mμ	millimicron(s)
mol.	molecule, molecular
mol. wt.	molecular weight
m.p.	melting point
μ	micron(s)
mv.	millivolt(s)
n	index of refraction (n_D^{20} for 20° and sodium light)
N	normal (as applied to concn.)
petr. ether	petroleum ether
p.p.m.	parts per million
ppt.	precipitate
pptd.	precipitated
pptg.	precipitating
pptn.	precipitation
qual.	qualitative (not qualitatively)
quant.	quantitative (not quantitatively)
r.p.m.	revolutions per minute
sol.	soluble
soln.	solution
sp. gr.	specific gravity
sp. heat	specific heat
sp. vol.	specific volume
sq. cm.	square centimeter(s)
U.S.P.	United States Pharmacopeia
v.	volt(s)
vol.	volume (not volatile)
w.	watt(s)
wt.	weight

* These abbreviations are used by Chemical Abstracts and, accordingly, have wide recognition.

4.22 ISOMERIZATION DURING HYDROGENATION II. METHYL CIS-10, CIS-12-OCTADECADIENOATE

Allen, R. R. (Armour & Co., Chicago)
J. Am. Oil Chemists' Soc. 33, 301-4 (1956)
Chemical Abstracts 51, 206 (January 10, 1957)

4.22 THE COURSE OF HYDROGENATION OF SARDINE OIL

Takeda, Maromi and Toyama, Yoshiyuki (Nagoya Univ.)
Abura Kagaku 6, 10-13 (1957)
Chemical Abstracts 51, 18655 (November 25, 1957)

6.3 THE IODINE CONTENT OF THE MARINE FLORA AND FAUNA IN THE NEIGHBORHOOD OF NANAIMO, VANCOUVER ISLAND, BRITISH COLUMBIA (WITH AN APPENDIX ON THE ECONOMIC VALUE OF THE PACIFIC KELPS)

Cameron, A. T. (University of Manitoba, Winnipeg, Canada)
Contributions to Canadian Biology (Supplement to the 47th Annual Report of the Department of Marine Fisheries, Fisheries Branch), Sessional Paper No. 39b, 51-68 (1915)

Specimens of different species of algae were obtained, and also specimens of representatives of most of the animal phyla. The selection of the latter was made more or less at random, and analysis of different tissues of the species examined was not systematic; the investigation is to be regarded as preliminary, with the purpose of indicating the direction for further work. Complete examination of the tissues of the dogfish, (Squalus suckleyi), was carried out.

6.3 THE COMMERCIAL VALUE OF THE KELP BEDS OF THE CANADIAN PACIFIC COAST--A PRELIMINARY REPORT AND SURVEY OF THE BEDS

Cameron, A. T. (University of Manitoba, Winnipeg, Canada)
Contributions to Canadian Biology (Supplement to the 5th Annual Report of the Department of Naval Service, Fisheries Branch), Sessional Paper No. 38a, 25-39 (1916)

The kelp beds of British Columbia waters can supply far more potash and iodine than the amount used at present in Canada. Definite evidence is adduced that the growth of kelp is largely dependent on the salinity of the containing water. Macrocystis pyrifera requires a more saline habitat than Nereocystis lutkeana. Both species grow more luxuriantly the more saline the containing water.

6.63 BIOCHEMICAL STUDIES ON THE LIQUEFACTION OF FISH BODY--III. ON THE EFFECTIVENESS OF FISH-AUTOLYSATE TO THE CULTURE OF BACTERIA

Tomiyama, Tetsuo and Kawazoe, Azuma
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 12, 1226-1232 (1956) (In English)

A preparation that is more effective in culturing bacteria than Liebig extract and peptone has been obtained by autolyzing whole fish body.

6.63 THE PREPARATION OF FISH AUTOLYZATES BY THE METHOD OF AUTODIGESTION OF THE INTACT FISH

Chanpalov, P. F.
Uchenye Zapiski Dagestan. Nauch.-Issledovatel. Inst. Proizvod. Pitatel'n. Sred No. 2, 28-36 (1956)
Chemical Abstracts 52, 606 (January 10, 1958)

Fish autolyzates containing free amino acids were obtained by subjecting the ground fish to a process of autodigestion in the incubator at 44° for 5 days with the addn. of H_2O, acid or alkali, and $CHCl_3$ or by the rapid method of autodigestion at 52° to 54° for 7 to 9 hrs.

6.79 SPECTROPHOTOMETER DETERMINATION OF IRON, MANGANESE, COPPER, MOLYBDENUM, COBALT, AND TOTAL PHOSPHOROUS IN HAKE ROE

Medina Blanco, M.; Nino Larru, F.; and Lobillo, E.
Anales de Bromatologia 8, No. 3, p. 313 (1956) (Madrid, Spain)
World Fisheries Abstracts 9, 27-28 (March-April 1958)

Average results in p.p.m. obtained were: Fe_3, 382.5; Cu, 10.9; Mn, trace; Mb, nil; Co, 26.1; and P, 60.

6.79 SEPARATION OF FREE AMINO ACIDS IN HAKE ROE BY CHROMATOGRAPHIC SEPARATION ON PAPER

Nino, F. and Lobillo, E.
Anales de Bromatologia 8, p. 319 (1956) (Madrid, Spain)
World Fisheries Abstracts 9, 27-28 (March-April 1958)

The following amino acids were identified: valine, arginine, phenylalanine, glycocoll, glutamic acid, serine, and proline. In the chromatogram, there were 2 spots that are supposed to correspond to lysine or threonine and leucine or isoleucine.

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner and Freezer
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feed Bag (supersedes Flour and Feed)
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fishing Gazette
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Gourmet
Industrial and Engineering Chemistry
Industrial Refrigeration
Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fisheries Abstracts
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

- - -

Editorial Clerk (Typist)--Gladys K. Chandler

7.53 SPECTROPHOTOMETRIC DETECTION OF FISH OILS

Giovanni, D'Arrigo (Univ. Catania, Sicily)
Boll. inform. ind. olearia e saponiera 3, 51-4 (1957)
Chemical Abstracts 52, 7739 (May 10, 1958)

Fish oils, after isomerization (J. A. O. C. S. tentative method; Stillman, C. A. 45, 8273e), give characteristic absorption spectra in the ultraviolet field, with absorption bands between 235 and 350 mμ. In linseed oil contg. 10 percent whale oil, such bands were well visible.

7.54 REPORT ON TOTAL SOLIDS AND ETHER EXTRACT IN FISH AND OTHER MARINE PRODUCTS

Risley, H. M. (Food and Drug Administration, Department of Health, Education, and Welfare, Seattle, Washington)
Journal of the Association of Official Agriculture Chemists 40, 343-345 (May 15, 1957)

A Babcock method for the determination of fat in canned salmon was adapted from a procedure for fat in meat products published by Harold Salwin, I. K. Bloch, and J. H. Mitchell, Jr., of the Quartermaster Food and Container Institute for the Armed Forces, Chicago, Illinois, in J. Agr. and Food Chem. 3, 588 (1955). Results on 42 cans of salmon have been compared with results obtained by the official method (Official Methods of Analysis, 8th Ed., 18, 12) and by a rapid ether shake-out method reported in this Journal, 37, 602 (1954). The results by the Babcock method tend to be slightly lower than those by the official method, but they are more consistent and precise than by the ether shake-out method over the range of fat content (2.5 to 15.5 percent) of the cans in this study.

7.66 THE DETERMINATION OF VITAMIN D AND RELATED COMPOUNDS PART 1. INTRODUCTION AND PREPARATION OF COMPOUNDS IN THE IRRADIATION SERIES

Shaw, W. H. C.; Jeffries, J. P.; and Holt, T. E.
The Analyst 82, 2-7 (January 1957)

7.66 THE DETERMINATION OF VITAMIN D AND RELATED COMPOUNDS PART 2. ANALYSIS OF IRRADIATION PRODUCTS

Shaw, W. H. C. and Jeffries, J. P.
The Analyst 82, 8-18 (January 1957)

8.51 AMINO ACID COMPOSITION OF SOME MARINE FISHES

Chari, S. T. (Fisheries Technol. Sta., Kozhikode)
Indian J. Med. Research 45, 77-80 (1957)
Chemical Abstracts 51, 11608 (August 10, 1957)

The essential amino acid contents of 5 marine fishes were determined by paper chromatography. While the general pattern of the amino acid compn. was the same in most of the fishes studied, there was a consistent absence of tryptophan in the sardine group. Pomfret ranks high in its content of several amino acids, especially the leucines.

8.51 SEMIDRYING OF PRAWNS AND ITS EFFECT ON THE AMINO ACID COMPOSITION

Chari, S. T. and Venkataraman, R. (Fisheries Technol. Sta., Kozhikode)
Indian J. Med. Research 45, 81-4 (1957)
Chemical Abstracts 51, 11608 (August 10, 1957)

The preservation of prawns by the process of semidrying does not alter to any appreciable extent the nutritive value with respect to the proximate chem. compn. or the amino acid make-up of the muscle protein. Prawns contain all the principal amino acids in fairly good amts.

8.51 CHANGES IN THE ~~BLOOD~~ SERUM PROTEINS OF WINTERING CARP

Sorvachev, K. F. (State Univ., Moscow)
Biokhimiya 22, 872-8 (1957)
Chemical Abstracts 52, 4871 (March 25, 1958)

A study was made of the muscles and blood serum proteins of one-year-old carp.

8.51 AMINO ACID COMPOSITION OF THE PYLORIC CAECA OF SKIPJACK, KATSUWONUS VAGANS

Kakimoto, Daiichi; Kanazawa, Akio; and Kashiwada, Kenishi (Kagoshima, Univ.)
Nippon Suisan Gakkaishi 22, 631-3 (1956-57)
Chemical Abstracts 52, 8392 (May 25, 1958)

8.51 CHANGES IN ADENINE NUCLEOTIDES OF SQUID MUSCLE

Saito, Tsuneyuki; Arai, Ken-ichi; and Tanaka, Tsune (Hokkaido University, Hakodate, Japan)
Nature 181, 1127-1128 (April 19, 1958)

In fresh squid muscle that was kept at -5° C. for 50 hours, a rapid dephosphorylation of adenosine triphosphate occurred with a concomitant accumulation of the diphosphate and the monophosphate during the first 10 hours. Further gradual accumulation of the monophosphate and a decrease in the diphosphate occurred during the next 15 hours. Adenosine monophosphate, which was formed without any conversion to inosine monophosphate, was converted to inosine and then to hypoxanthine. Specific phenomena observed were (1) an accumulation of adenosine monophosphate, (2) no rapid splitting of adenosine triphosphate, and (3) no accumulation of inosine monophosphate.

INDEX

Subject	Page No.	Card No.
Analysis, organic		
Free sugar in cod muscle	11	7.599
Fat in whale meat	15	7.53
Detection of fish oils	23	7.53
Fat in canned fish	23	7.54
Analysis, vitamins, vitamin A		
Adsorption of vitamin A from fish oils	11	7.61
Analysis, vitamins, miscellaneous		
Determination of vitamin D	23	7.66
Analysis and composition, specifications and oil constants		
Federal specifications	15	8.7
Byproducts, miscellaneous		
Insulin from fish	13	8.51
Analysis of hake roe	21	6.79
Canned fish, processing		
Problems in lobster canning	7	3.33
Greening of tuna	9	3.331
Canning suckers	11	3.335
Chemistry and biochemistry, miscellaneous		
Carp myogen protein	17	0.32
Composition of fish tropomyosin	17	0.32
Analysis of whale pepsin hydrolysates	17	0.38
Amino acids liberated by whale insulin	17	0.38
Denaturation of whale pepsin	17	0.38
Composition, inorganic		
Composition of trout blood	13	8.42
Composition, organic		
Dimensions of cod muscle cells	15	8.9
Acid lipides present in muscle extract	19	4.13
Fat in cod flesh	19	4.13
Pyloric caeca of skipjack	23	8.51
Carp serum protein	23	8.51
Protein in dried prawns	23	8.51
Squid muscle nucleotides	23	8.51
Protein in marine fish	23	8.51
Amino acids of carp protein	25	8.51
Phenylalanine and arginine in fish	25	8.51
Amino acids of whale pepsin	25	8.59
Creatine phosphate in carp	25	8.59
Composition, vitamins		
Vitamin B_{12} in skipjack caeca	25	8.64
Vitamin B_{12} in sea water	25	8.64
Cookery		
Smoke barrel cookery	1	2.8
Sole cookery	19	2.8
Fish meal, nutritive value		
Unidentified growth factor resources for turkeys	13	6.193
Fishery biology and fish culture		
Body temperature of fish	15	9.13
Fishing concerns and agencies		
Pacific fisheries directory	25	9.4
Fishing methods		
Electrical fishing gear	3	2.143
Freshness of fish		
Measuring texture	13	7.86
Frozen fish, changes in during freezing and cold storage		
Frozen whale meat	7	3.249
Gear, fishing		
Operation of trawl	3	2.1121
Furinawa seine results	19	2.1125
Single versus double seines	19	2.1125
Handling fresh fish		
Sanitation of frozen foods	5	2.3
Icing fillets	5	2.3
Marine plant products		
Constitution of Pacific kelps	9	6.3
Kelp beds of British Columbia	21	6.3
Iodine content of marine life	21	6.3
Marketing		
Portion control foods	7	3.26
Nutritional value of fish and toxicity		
Amino acids of fish	3	2.9
Amino acids of shark and skate	5	2.9
Struvite in canned sea food	9	3.39
Properties of thiaminase	19	2.9
Thiaminase activity	19	2.9
Nutritional value of fishery byproducts other than meal		
Growth factor transmission	11	6.55
Autodigestion of fish	21	6.63
Autolyzed fish media	21	6.63
Oceanography		
Oceanography bibliography	25	9.6
Oils, chemical and physical properties		
Isomerization	21	4.22
Hydrogenation of sardine oil	21	4.22
Preservatives and sanitation		
Preservation with antibiotics	5	3.12
Preserving gulf oysters	7	3.12
Salt fish		
Desalting whale meat	19	3.5
Salt tolerant yeasts	19	3.5
Spoilage		
Marine spore-forming bacteria	1	0.5
Determining fish freshness	1	2.00
Trimethylamine production	17	2.01
Discoloration of lobsters	17	2.03
Vessels, fishing		
Controllable pitch propellors	1	2.114
Plastic fishing boats	3	2.117

8.51 DETERMINATION OF ESSENTIAL AMINO ACIDS IN THE PROTEINS OF MEAT OF MAMMALS (CATTLE, SHEEP AND PIGS) AND EDIBLE FISH OF ARGENTINA. III. PHENYLALANINE AND ARGININE

Sanahuja, C. and Rios, D. Seoane
An. Bromatol. 8, 191-196 (1956)
Food Science Abstracts 29, 417 (October 1957)

Determinations, on a dry-weight, fat-free, and 16-percent-nitrogen basis, showed that the protein of a croaker (Micropogon undulatus), a silverside (Menidia bonariensis), horse mackerel (Scomber scombrus), a freshwater "palometa" (Serrasalmus marginatus), "pati" (Luciopimelodus pati), hake (Merluccius gayi), a red sea bream (Sparus pagrus), and weakfish (Cynoscion striatus) contained on the average, 4.63 percent of phenylalanine and 6.44 percent of arginine. There were no marked differences.

8.51 AMINO ACID COMPOSITION OF PROTEINS OF ONE-YEAR-OLD CARP AND THEIR FOODSTUFFS

Petrenko, I. N. and Karasikova, A. A.
Rybnoe Khoz. 33, No. 10, 62-3 (1957)
Chemical Abstracts 52, 4039 (March 10, 1958)

Amino acid compn. of proteins of different parts of one-year old carp and foodstuffs used in their feeding was detd. by paper chromatography.

8.59 STUDIES ON THE ORGANIC PHOSPHATES IN MUSCLE OF THE AQUATIC ANIMALS

Saito, Tsuneyuki and Arai, Ken-ichi
Bulletin of the Faculty of Fisheries Hokkaido University 8, No. 1, 51-53 (May 1957) (English abstract, table, and figures)

IV. The effects of storing temperature upon the creatine phosphate content of carp muscle.--Creatine phosphate was broken down rapidly as the storage temperature increased in the range from -4° C. to 36° C.

8.59 STUDIES ON CRYSTALLINE WHALE INSULIN II. AMINO ACID COMPOSITION

Saito, Tsuneyuki; Ishihara, Yoshio; Ito, Yasuzo; and Fujino, Masahiko
Bulletin of the Faculty of Fisheries Hokkaido University 8, No. 1, 54-58 (May 1957) (English abstract, tables, and figures)

The amino-acid composition of hydrolysates of crystalline whale insulin was determined by chromatography on columns of Dowex-50-X8. The amino acid residues found in the whale insulin molecule, which has a minimum molecular weight of 5719, were as follows: aspartic acid, threonine, serine, glutamic acid, proline, glycine, alanine, cystine, valine, isoleucine, tyrosine, phenylalanine, histidine, lysine, and arginine.

8.64 STUDIES ON B-VITAMIN OF PYLORIC CAECA OF SKIPJACK, (KATSUWONUS VAGANS)--IV. ON VITAMIN B_{12}

Kakimoto, Daiichi
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 10, 634-636 (1957) (English synopsis, figure, and tables)

The vitamin B_{12} content in pyloric caeca of skipjack was determined by Euglena method and by Lactobacillus leichmanannii method.

8.64 STUDIES ON VITAMIN B_{12} IN SEA WATER--II. ON THE ASSAY METHOD AND THE DISTRIBUTION OF THIS VITAMIN B_{12} IN THE OCEAN

Kashiwada, Ken-ichi; Kakimoto, Daiichi; Morita, Tomokazu; Kanazawa, Akio; and Kawagoe, Kazunori
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 10, 637-640 (1957) (English synopsis, figures, and tables)

A report on the vitamin B_{12} content of sea water collected by the "Kogoshima-Maru" at stations in the North Pacific from Latitude 0° to 30° N on the line of Longitude 130° E.

9.4 ANNUAL REPORT OF THE FISHERIES RESEARCH BOARD OF CANADA FOR THE YEARS 1956-1957

Anonymous
Annual Report of the Fisheries Research Board of Canada, 1956-1957, 195 pp. (March 31, 1957)

(Abstract of this article appears under 0.6 page 1 - June 1958)

9.4 DIRECTORY--PACIFIC FISHERIES ORGANIZATIONS (DATA AS OF JANUARY 1, 1957)

Anonymous
Pacific Fisherman Yearbook Number 55, 73-79 (January 25, 1957)

9.6 BIBLIOGRAPHIA OCEANOGRAPHICA--1950

Anonymous
Bibliographia Oceanographica 23, 521 pp. (1956) Commissione Internazionale per L'esplorazione Scientifica Del Mare Mediterraneo - Delegazione Italiana (Italy)

United States
Department of the Interior
Fish and Wildlife Service
Washington 25, D. C.

Official Business